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PUBLIC HEALTH REPORTS

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frontispiece

Occupational therapy can help the physically handicapped to help themselves. This picture shows an example of the work at a county rehabilitation clinic discussed on page 1201.

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128 pages. A summary and information on availability appear on page 1249.

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U. S. DEPARTMENT OF HEALTH, EDUCATION, AND WELFARE
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An experience in interprofessional team action directed toward rehabilitation of the adult poliomyelitis patient.

Social Considerations in Patient Management

By GEORGIA B. TRAVIS, M.A.

ANY prolonged illness which takes the young adult from his vocational preparation, from breadwinning or homemaking, and places him in the unaccustomed role of patient obviously makes great realistic and psychological demands upon the individual and his family. The degree to which equilibrium is disturbed depends on the interrelationship of several factors, namely, the nature of the illness, the age and personality of the patient, and the manner and degree of family and personal disruption created by the absence of the patient.

Medical management can determine, in part, whether the disturbance will prove catastrophic, leading to permanent, almost total, destruction of normal satisfactions for patient and family, or whether it will prove temporary, altering the pattern, yet not destroying the groundwork, for constructive living. Furthermore, the ability of the patient to utilize medical care to the maximum will depend on how adequately his social needs are met. These are the reasons why hospital personnel are concerned with social needs.

We are especially alert to what we learn from working with any group of long-term patients because each experience becomes potentially valuable in planning the chronic disease programs of tomorrow. A focus on rehabilitation obviously will be necessary in these programs if they are to be constructive and no more expensive than necessary. Rehabilitation-slanted efforts require interprofessional team action, a method more easily praised than implemented and dependent for its success on medical leadership.

At Colorado General Hospital, a part of the University of Colorado Medical Center in Denver, the application of the multidisciplinary approach over approximately 10 years in working with poliomyelitis patients has yielded certain observations. Some may have wider applicability.

The hospital is small, having only 300 beds. It is tax-supported, and the only private patients there are those under circumstances of special need. The cost for these poliomyelitis patients, all adults, is paid by the National Foundation for Infantile Paralysis. This organization not only has made possible the financial support of the patients but has greatly aided the teaching activities. It has also encouraged a team approach, which was easily and naturally evolved through the stimulus of Dr. Winona Campbell, long-time director of

Mrs. Travis was director, medical social service, University of Colorado Medical Center, Denver, from July 1946 to August 1, 1955. She is now medical social consultant, disability freeze unit, Washington State Department of Public Assistance. Mrs. Travis is the author of "Cultural Framework of Maternal and Child Health Services in Australia" (Medical Social Work, January 1955), written as the result of a Fulbright lectureship at the University of Sydney in 1953.

the poliomyelitis unit, and, later, of Dr. James Stephens, the present director.

The Patients' Problems

In poliomyelitis the sudden onset, the need for isolation, the uncertainty regarding extent of paralysis, the respirator care in bulbar cases, and the community fear or panic during an epidemic create certain characteristic problems during the early stage. Later arise the problems connected with family, school, or job disruption, and anxiety as to the degree to which affected parts will respond to treatment.

Still later, among the dwindling group who remain in the hospital, arise the difficulties from monotony and vegetation, from the adjustment to being relegated to the status of uninteresting chronic cases after a dramatic period of great attention, from very deep fears about the future, and from competitive anxiety upon seeing other patients make faster gains.

Finally, whether patients with residual paralysis go home early or late, they have the problems of being discharged home crippled to a greater or lesser degree, to carry on with medical recommendations, and to take up the task of competing with normal people in the outside world.

Despite their similarity, each problem varies according to the patient. Let us look, for example, at what the sudden transition from full activity to respirator status meant to three individuals.

One patient, the mother of six children, one of whom was an infant, said that as she lay in the respirator all she thought about was that she had left the house for the hospital with only one bottle of formula mixed ahead for the baby. No one else in the family knew the formula.

Another patient said that one of his wife's best friends had died in a respirator 2 years previously, that he thought he would die and knew that his wife thought so too. His main concern was getting his mother to come from another State before his wife went to pieces.

The third patient, a waitress responsible for the support of her little girl, had been rushed to the hospital before she could make plans for the child. Because she could not speak, we did not even know of the child's existence until the landlady telephoned that the little girl had no shoes. The mother could only shake her head and cry when the child was mentioned.

To need to depend for one's breath on something outside one's self is, indeed, the ultimate in dependence. It is not strange, therefore, that the patient who is rushed to an iron lung from the excessive activity which so often seems to precede onset is anxious about yielding up his life to the efficiency of a machine. The fear induced by even the rattle of an uneven caster is familiar to us.

This common reaction is highlighted by the feelings of a patient who unfortunately was in a respirator with faulty hatches which occasionally blew open, lowering the pressure so that he could not breathe or cry for help. The respirator was repaired as soon as the problem was discovered, but during his entire period in an iron lung the patient lay in a state of tension, listening for the clickety-clack of the hatch, particularly during the graveyard shift when a nurse came in the room only every 15 minutes. He said that he knew he would be dead 14 minutes if the hatch went out the minute after she left. The patient was actually traumatized by his experience and still has a lack of confidence in the chest respirator.

During the acute period of poliomyelitis the patient's uncertainty regarding the extent of paralysis which will develop is another common form of distress. Patients tell us that they wonder whether they will wake up the next morning with another limb paralyzed. They describe nightmares of finding they cannot move at all.

One pretty woman, who felt insecure with her husband and who relied on her charms to hold him, had facial paralysis so that her eye and mouth were drawn down and she could not manage her tongue. She was horror-struck over her appearance. When she asked the physician how much farther the paralysis would go, he told her honestly that he did not know. She later described her anguish over what would happen next. She told her husband that he did not need to visit a "monster," and he told us that she offered to get a divorce.

Isolation adds its problems to the acute stage. During the period of fear, distress, and regression which illness brings, the patient needs the

warmth and reassurance of his family. Complete isolation not only sharpens his distress but heightens the family's panic. The physicians here have greatly lessened the number of overwrought patients and relatives by permitting relatives to come to the patient's door during the isolation period.

The Value of Social History

Lack of space prohibits describing the damage poliomyelitis causes to family ties and the reasons for a gradual deterioration of the patient's morale. Our concern in this discussion is how to prevent the panic and worries and family damage of the early stage, with their concomitants of irritability and uncooperativeness, how to obtain the earliest possible hospital discharge, how to prepare the patient for adjustment to his handicap constructively when he goes home. We have not found all the answers, and we do not always put into effect those we do know. However, there are certain things we have learned to do or not to do, and these I will describe.

From the beginning the patient must be understood as an individual and treated accordingly. Although the initial social history obtained from family members and the patient is often far from conclusive, it does afford a base from which the hospital team can proceed. Therefore, the history should be taken within the first few days after admission.

The nature of the epidemic slants the initial histories in that above all else the hospital beds must be kept cleared during the height of the season, and, if most of the patients are improving rapidly, we must know which of them has a suitable home to go to, which patients might be eligible for another hospital, and those patients for whom community planning must be begun immediately if the bed is to be released as soon as the patient is medically ready. Because time is too limited during these early days to permit individual exchanges of information among members of the team, regular conferences are held for all professional personnel. Pertinent information is shared at these conferences, and the plan for the patient's immediate future is decided.

The initial history provides information about the physical setup of the home and an estimate of the capacities of the family to provide convalescent care and make arrangements for outpatient supervision and physical therapy. In addition the social history gives the medical social worker information about urgent family problems which she needs to take care of so that the patient is not needlessly harassed. The history provides an understanding of what the patient is worrying about. This insight will help personnel deal considerately with irritable or demanding behavior. If the worries are, as they so often are, about the patient's own condition or treatment, the informed physician can clear up the patient's misapprehensions and gauge his interpretations accordingly. Attention to the patient's problems and fears lessens the trauma of poliomyelitis to the patient. It makes him realize that the institution is genuinely interested in him and, therefore, that he can relax and trust the staff. Through the lessening of the patient's anxieties, the demands upon medical and nursing personnel become a little less.

Sensitivity in Management

The administration of the hospital vitally affects meeting the patients' social needs. For example, installation of a telephone system, which made it possible for patients to talk to their relatives, proved to be a most constructive measure in reducing worries. Relaxation of visiting hours permitted a great degree of personal security for patients and relatives. Secretarial service for group conferences, facilitating a flow of abstracts to local referring physicians and discharge recommendations to local health and welfare departments and national foundation chapters, helps to assure the continuity of care which is so essential but so difficult to maintain at a time when it is even more difficult than usual to handle routine paperwork.

The management of transferring patients to another hospital deserves special mention. The pressure for beds and of time tempts making a hasty arrangement in which the patient has not shared. The patient receives an abrupt reminder of his powerlessness over his own destiny if he is notified that an ambulance will take

him to another hospital within a few hours. Other patients, identifying themselves with their departing companion, may greatly resent their own helplessness.

This is the kind of destructive experience which leads to an eventual apathy or a sense of futility. Fearfulness over being moved, even into another ward, is evident in both adults and children with long-time disease and can only be accounted for by the transference of former associations of security to the particular bed or ward or respirator in which the patient is lying.

It is difficult for the patients who remain in the ward to see their former co-patients get better more quickly and leave. The interim months after the peak of the epidemic, when patients having some residual paralysis go home or transfer to another hospital, are particularly trying in several ways. This period coincides with the time when the nurses who arose to the emergency become bored with enemas and baths.

From the standpoint of the patient's mental health, expressions of hostility are welcome, and griping is not discouraged. However, as hostility is so readily attached to immediate objects, the nursing service and the food receive the greatest impact. The physician and the nurse in charge have a great responsibility of interpretation to the staff members who are in the direct line of fire.

While the physician and head nurse are coping with these problems, the medical social worker and the occupational therapist can also be of help to the patient. By getting the patient to talk out his feelings and by listening with understanding, the medical social worker can give support to the patient who despairs about his future. Encouraging the patient to use his good extremities in constructive occupation, which happens incidentally to work off some anxiety, and devising activities that will take the patient's mind off his troubles are among the contributions of the occupational therapist at this time.

Group recreation is very important although we are providing it in only a limited way. Until the advent of television, movies were the patient's first choice. Movies were so desired that our patients have taken up collections among themselves to rent films in order to supplement the movies the hospital has been able to provide. Television now provides the most important outlet for escape from reality. Religious services have proved of great benefit to some patients, as have the individual visits of the chaplain and the ministers. Volunteers who provide either group entertainment or individual friendly visiting have also been of real value.

When the long pull sets in for the badly handicapped patients, the hospital encourages families to take patients home for weekends or holidays. These patients are given passes to leave the hospital as soon as their physical condition permits. This policy of weekend and holiday leave requires substantial sacrifice from nursing personnel because the patient must be dressed and undressed at odd hours, often the busiest or least staffed times of the day.

Although the patient longs to go home, his first visit especially may be very difficult. For the first time, he goes up his own sidewalk and stairs as a cripple, rather than as a fireman or an electrician striding home for supper or as a mother with her arms full of groceries. However, the gradual adjustment to the outside world during hospitalization makes the eventual discharge much less difficult for the patient and less fearsome for the family. The trips outside have helped break the monotony. Most of all, they have helped the patient remain part of the family group.

The feeding of patients who have paralysis of the upper extremities is another management problem bearing on the patient's eventual adjustment. And more, it is a practical problem of no small magnitude. The patient should be fed when the tray arrives. Like being moved without warning, for one to lie watching the hot soup grow cold and the grease congeal around the meat is a dismal reminder of complete helplessness. To be fed like an infant is bad enough.

Planning Vocational Rehabilitation

Early vocational rehabilitation planning is another constructive measure which can be employed. The mills of vocational rehabilitation grind slowly so that aptitude testing and initiation of forms and counseling service need to be

set in motion early. Doing something or reading something which the patient feels is directly related to earning a livelihood after discharge brings much stronger motivation than activities which are busy work or amusement.

Furthermore, the successful vocational rehabilitation of the handicapped person is the greatest single process in restoring his means of earning money, having a daily occupation, and usefulness to his family, thereby achieving self-esteem and the respect of others. The remarkably ingenious talents of the physical therapist and the occupational therapist can be made to count if the occupational goal of the patient has been established long before he leaves the hospital.

Patient-Physician Relationship

Of all the measures which are employed to sustain and develop the morale of the long-term patient, an almost intangible one, but calling for deliberate action, is that termed supportive help. Morale is basically a matter of self-esteem. A philosophical maturity not ordinarily encountered in the young is required before people are capable of separating the value of personality or self from that of the beauty and usefulness of the body. The equating of physical worth with personal worth must be broken down if the patient is to value himself sufficiently to make the tremendous efforts which are and will be required of him.

We are indebted to those who have worked with other diagnostic groups, notably cancer patients, for the knowledge that one can help a patient make the separation of inherent value of body and personality by utilizing the knowledge that most people place upon themselves the value that other people place upon them. If, by the actions and attitudes of others, a patient is made to know that he is a valued human being, worthy of sustained consideration and interest, it does much to lessen his feeling of worthlessness. All hospital personnel do contribute, positively or negatively, to the patient's attitude toward himself.

The physician's role is particularly significant. The patient may be especially attached to a particular nurse or physical therapist, and it is the medical social worker's special job to give the patient support. However, there is no one who has the meaning to the patient that the physician has. The doctor's small acts or words take on far greater importance to the patient than even the doctor may realize. In a teaching hospital this may pose a problem more serious than is readily apparent. The chronic patient lacks medical interest, and the intern or resident or staff physician who was so interested in him when he was acutely ill now may pass him by.

The change of resident physicians or transfer of the patient from an internist to an orthopedist, although intellectually comprehended as part of the system, may actually seem to the patient desertion by his most cherished friend, although the word "friend" does not connote the combination of dependency, veneration, and desperate hope which go into a paralyzed patient's feelings about his doctor. Knowing perhaps the reasons for the casualness which social workers sometimes display in transfering patients to other workers, I am aware that the physician may feel embarrassed or think he is being egotistical to consider how much he means to the patient. The doctor may not realize that it is not he as an individual but rather what the patient has vested him with that makes him so important.

The value the physician seems to set on the patient becomes to the patient a measure of his own worth. Because the patient must sustain a feeling of personal worth if he is to strive, the efforts of our sensitive physicians in going beyond the line of duty to show their continuous interest in the patients have been of immeasurable value.

Planning for Discharge

Discharge planning for the badly handicapped patient must be begun a long time before the patient is to leave. Suitable housing will be the most difficult need. If the patient will require a nurse, there must be room for her in his home. Arranging for a housekeeper or practical nurse is a time-consuming task. Financial resources usually cannot be secured quickly. The patient's long-time participation in working out details with the worker and his family helps his adjustment to the frightening

matter of leaving the haven of the hospital. The long planning also helps the family ready themselves psychologically. Severe disruption in family life can take place during the long absence of one member. If this has not been prevented or if it has been augmented, as sometimes happens, discharge may be very difficult to work out.

With a respirator patient particularly, obtaining and financing equipment may be another long-time matter. Any hospital without a medical social worker is practicing poor economy in respect to discharges because the majority of patients and families must have help in planning and carrying out discharge arrangements. Finally, it should be said that hospital discharge merely ends one phase of the patient's social needs. Before he leaves our care some professional person or persons in his own community must be found to help him with the difficult problems that lie ahead.

In conclusion, our goal with poliomyelitis patients is to send them home as quickly as possible and to send them there as fit as possible to meet the problems which await them. To do this, we must try to understand the patient as an individual and to adapt medical management accordingly. Social needs warrant not only the concern and activities of the medical social worker but the joint effort of the entire hospital staff as well. This joint effort is promoted by regular conferences in which all concerned with the patient's treatment share information about and decide on plans for his individual care. Our common effort is directed toward reducing worry, preserving family strength, reducing reminders of helplessness, providing mental stimulation, encouraging gradual adjustment to the outside world, sustaining the individual's belief in his own worth, and promoting early vocational and discharge plans.

New Aramite Tolerance

The Food and Drug Administration announced on October 3, 1955, a permissible tolerance of 1 p.p.m. of the pesticide chemical Aramite for 19 food crops.

The tolerance level applies to apples, blueberries, cantaloupes, celery, cucumbers, grapefruit, grapes, green beans, lemons, muskmelons, oranges, peaches, pears, plums, raspberries, strawberries, sweet corn (kernels, but not forage), tomatoes, and watermelons.

Commissioner George P. Larrick said no residue of the pesticide, however, would be permitted to remain on forage crops such as alfalfa. This is in line with FDA's policy that milk should be kept free of any pesticide because of its dietary importance to infants and invalids.

The tolerance level was set under a new law requiring the Department of Health, Education, and Welfare to determine what amounts of pesticide residue can safely be permitted to remain on food crops.

"Medical and social advances toward substituting treatment for the punishment of problem drinkers have not been matched in politics and in law."

Legislation and Alcoholism

By JULIUS ISAACS, J.D.

THE report of the Committee on Public Health of the New York State Bar Association (*1*) points up again the legal implications of public health practice applying to alcoholics. In understanding alcoholism, great progress has been made in the last 15 years. The affliction, now considered a major health problem, it is felt, can be treated successfully in many instances. Differences as to its nature and treatment do not prevent the accumulation of a body of knowledge which will help restore to health many whose lives are threatened by this disease. We must frankly concede that we do not know all the answers, but we have indications that we can find the right track.

We are learning to distinguish between alcoholism and problems associated with drinking that may be merely casual however toxic may be the concentration of alcohol in the blood. Such a distinction is essential if the courts, the physicians, and the social services are to prescribe appropriate treatment. There is no blanket definition, diagnosis, or treatment to be applied to people who drink "too much"; people who drive a car with a few drinks in them; psychotics who drink; homeless men who become drunk; criminals with a taste for liquor; or divorced people who occasionally tipple. People with liquor on their breath, no matter how frequently they are in trouble, cannot all be lumped under the convenient label of alcoholics. To ignore the many distinctions among drinkers is to invite practical objections from judges, police, or anyone else who must cope with these persons.

Psychiatrists, social workers, Alcoholics Anonymous, and others will be the first to protest that techniques which have proved successful with certain well-defined kinds of drinking problems are of little avail in others. While we shift slowly from the traditional attitude that drinking should be punished to the modern view that addiction to alcohol should be treated as an illness, we cannot free the sane drinker from legal or moral responsibility as if he were a victim of a virus. The drinker with a problem, as distinct from the problem drinker, is not suffering from a disease of alcoholism. If, in the paragraphs that follow, the portrait of alcoholism is not always in sharp focus, it is because so much confusion persists between the drinking problem and the problem drinker. But a modern program for dealing with alcoholism, as well as with other social problems associated with drinking, will help public health and legal institutions to refine their concepts and tailor their practices to the patient.

Alcoholism, in the sense that it is an obses-

Judge Isaacs formerly sat in the New York City magistrates' court and the court of special sessions. He is chairman of the board of visitors of Hart Island for the Welfare and Health Council of New York City and a director of the Association for Psychiatric Treatment of Offenders. A lecturer on medical jurisprudence, municipal government, city planning, and criminology, he is retiring chairman of the Committee on Medical Jurisprudence of the Association of the Bar of the City of New York.

sion, is a major social tragedy. Compulsive in character, progressive in its damage to the alcoholic, his family, and the community, it exacts a costly toll. In "skid row" sections, in courts, jails, and city hospitals, we find the visible alcoholics, about 20 percent of the total number. The invisible majority, with no record of arrests or hospitalization, are hidden in offices and homes. Most of these refuse to acknowledge their condition, even to themselves, until the very last stages.

In penthouse or slum, the affliction strikes both genius and dullard, male and female (6 men to 1 woman). Most of the male alcoholics are in the prime of life, 85 percent being between the ages of 35 and 55. The alcoholic's life is curtailed by 2 to 12 years. The incidence of divorce is much above normal; 16 percent of the married male alcoholics are divorced and 25 percent separated. In New York City magistrates' home term court, 70 percent of the cases involve excessive drinking (*2*).

Alcoholism's annual toll of wage loss is estimated at half a billion dollars. The National Safety Council considers $120 million alcoholism's annual contribution to preventable accidents. Attributable relief costs are $22 million. Hospitalization for injuries and incarceration cost $56 million. A good guess of the total enormous private and public cost to victims and society is well over a billion dollars a year (*3*).

Nevertheless, few States or cities have laws or procedures that provide for treatment and rehabilitation of the compulsive drinker. In trouble, his usual fate is a term of "reform" in prison. Medical and social advances toward substituting treatment for punishment of problem drinkers have not been matched in politics and in the law.

It is hardly practical to look upon prison to "reform" the parade of drunkards that passes before a police court. Park benchers, alms solicitors, and disorderly persons as well as workingmen on a spree may be among the derelicts. Honest seamen temporarily on the beach and out-of-work longshoremen mingle with hopeless down-and-outers and periodic dipsomaniacs. Indiscriminate suspended sentences or short jail terms are futile for the chronic alcoholic. It is impossible even to separate the celebrators from the addicts. The defendants come before the judge in such numbers that he may not have time even for routine questions. As a first step, we need screening facilities to determine which defendants are in need of medical care and hospitalization. Adequate information, obtained before arraignment, would give judges information for proper disposition of cases. By such a procedure, confirmed alcoholics may be taken off the streets and committed to an institution for treatment if the legal mechanism for commitment is available and the legal criteria for commitment satisfactory.

The Hart Island Experiment

In a short-lived attempt to establish in August 1950 on New York's East River a place where a defendant might come for rehabilitation on a voluntary basis rather than go through the court's revolving door, New York City had a partial screening process. Here a special institution for handling homeless men whose problems were largely those of the indigent alcoholic was being created. These unfortunate people could voluntarily seek welfare department rehabilitation at Hart Island in preference to a correction department's jail. There was no compulsion to stay for any specified time. But one who left in less than 10 weeks could not return, and a suspended sentence might be executed. Medical care (including free eyeglasses and dentures when necessary), religious guidance, social therapy, Alcoholics Anonymous aid, vocational training, and job placement service were accorded to all. The rehabilitation program was humane, effective, and economically administered. It was a fruitful alternative to costly, barbaric, and useless successive jail sentences for those "offenses" which is society's label for the illness of alcoholism. Everybody had to work, selecting his job from the hundred or more work assignments for the operation and maintenance of the institution. Carpentry, electrical, laundry, kitchen, and dining room skills were on the way to being revived. With alcohol unobtainable, work to do, good food, recreation, and companionship, a change was soon noticeable. Weekly meetings of Alcoholics Anonymous helped in the struggle.

Resident employment counselors were there to obtain job referrals.

Since homeless men, such as those at Hart Island, rarely seek treatment and are afraid of being questioned, they are difficult to study. Accordingly, there is little scientific information about them as a group and their relation to alcohol. It was the recognition of this factor that led to the solicitation of the cooperation of the Yale Center of Alcohol Studies, which established a pilot study on the island.

The Yale center was not able to complete its work, for in the summer of 1954, because an increase in crime was held to require more jail space, Hart Island was overnight taken away from the New York City Department of Welfare and given to its Department of Correction. Thus, this potentially useful project ended before it was really on its feet. Whatever the needs of the correction department, the action eliminated a hopeful step in the treatment of alcoholism in New York.

In less than a 4-year period the widely heralded experiment at Hart Island appeared to offer a constructive approach. Since the experiment seemed to be sound in conception and efficient in operation, the Hart Island facilities were to be extended to include those who were not homeless but were willing to pay for rehabilitation there. It had been planned also to seek a State grant and a city budgetary appropriation for the creation of a halfway house to break the transition from the protected life at Hart Island to the competitive problems faced by the "alumni." This halfway house was to provide meals, lodgings, and recreation at cost in a controlled resocialization project until the Hart Island "graduate" had had a reasonable time to become secure in a newly achieved self-reliance—a self-reliance mixed with a dependence on an institutionalized way of life from which he must be freed at an individual pace. The Hart Island experience, as well as a somewhat similar project for study of homeless men sentenced to the Monroe County jail (conducted by the University of Rochester sociology department), might have provided the evidence needed to guide and obtain legislation for civil commitment to other nonpenal treatment facilities for wider varieties of the alcoholic sick.

This is the background to the note of disappointment implicit in the report of the New York State Bar committee. To explain that disappointment further, it is useful to make a brief survey of the history of legislation on the subject in New York.

Legislative Steps

New York State's progress toward enacting a sound alcoholism program has been slow. The penal law in force in 1897 provided: "Any person intoxicated in a public place is guilty of a misdemeanor, and may be arrested without a warrant while so intoxicated." In 1911, the words "is guilty of a misdemeanor" were deleted, eliminating such offenses from a category of "crime" (*4*). However, these persons were still subject to arrest in a lesser category of offense, such as disorderly conduct that annoys others. In order to resolve any ambiguity, the New York State Legislature amended the penal law in 1955 to provide that a person intoxicated in a public place may be arrested without a warrant while so intoxicated. If the charge is sustained and the person found guilty, he is deemed to have committed an offense. The amendment (ch. 823, L. 1955) makes proof of annoyance to others unnecessary. The arrest gives the magistrate original jurisdiction. But the problem still is what to do with an alcoholic when he comes before the judge.

In 1910, the inferior criminal courts act gave New York City the power to establish a board of inebriety and hospital and industrial colonies for the publicly intoxicated. In 1911, the State's general municipal law (secs. 136–139b) provided for boards of inebriety by localities outside of New York City. These sections have just been repealed (ch. 133, L. 1955) since no city operated such a colony, and the administrative provisions of the law are out of date.

In 1911 at Warwick, a hospital and colony was established by the New York City Board of Inebriety. With the enactment of prohibition in 1920, the board was abolished and the colony closed. The board's first report was the only one filed. Its functions were transferred to the New York City Department of Correction, again a step back to punishment. That department has taken no action except to receive

at Riker's Island some alcoholics sentenced there on a variety of charges.

New York's education law (sec. 804) provides for the compulsory teaching in schools of alcohol's evil effects. Its mental hygiene law (sec. 201) permits a judge of a court of record to commit an "alleged inebriate" to a private licensed institution for mental disorders on application of his family, a relative or friend, an officer of a charitable institution, a public welfare officer, or the inebriate himself. The physician in charge of the institution must present his consent in writing. In addition two examiners must certify that the subject is incapable of conducting himself or his affairs properly or is dangerous to himself or others by reason of frequent drunkenness, whether induced by alcohol or drugs or other intoxicating substances. The certificate must show that he is in actual need of special care and treatment and that his condition is such that his detention, care, and treatment would be likely to effect a cure. The section provides that a person so certified or a relative or friend may, within 30 days, apply for a review of the order of certification to the State supreme court. A jury then passes upon his inebriety. Private institutions have been unwilling to assume the responsibility for consenting to such commitments for fear of false-imprisonment suits. In addition only the rich could afford the cost of institutional care.

Under the present New York State law only psychotics may be retained and treated in State mental hygiene institutions. Haggard and Jellinek (*5*) have defined psychosis as insanity or mental disease. They report that only a small proportion of men who drink to excess develop alcoholic psychosis. Although psychosis is not a common occurrence in chronic alcoholism, certain changes in personality which cannot be called insanity do eventually occur in most chronic alcoholics. The authors state that in about 1.5 percent of chronic alcoholics the deterioration of conduct becomes complicated by uncontrolled rages, delusions, or other disturbing symptoms. The condition is then designated as chronic alcoholic deterioration with psychosis. The psychotic inebriate is segregated in mental institutions, and in that way society takes care of him. But the nonpsychotic inebriate at present gets attention from society only when he comes into conflict with the law. It is his illness which presents us with our primary challenge.

The world has been slow to consider the chronic alcoholic as a sick person. It has been slower still to concede that the alcoholic does not voluntarily choose the road to ruin. When the problem became acute, some localities "solved" it by jailing, some by exiling to other communities, and others by closing their eyes to the existence of any problem. From time to time, public opinion became aroused over these illusionary "solutions" and demanded action. It disturbed the community that arrest and jail were so expensive in money and lives. Finally, came a realization that here was a social problem better dealt with by appropriate social agencies than by police and prison. It was the social effects of alcohol that brought about the recognition of the need for committing alcoholics to treatment clinics rather than to jail.

In December 1948, the first clinic was established at the University of Buffalo, and the Edward J. Meyer Memorial Hospital set aside 20 beds for the treatment of alcoholic patients.

Through the efforts of the Medical Jurisprudence Committee of the Association of the Bar, the New York County Medical Society, and the New York City Academy of Medicine, the Rosenblatt bill was introduced in January 1949 providing a full-scale program. It called for the establishment of a bureau of alcoholic rehabilitation in the New York State Department of Mental Hygiene to study the causes, extent, prevention, control, and treatment of alcoholism and the rehabilitation of chronic alcoholics. To be established and equipped were hospitals, clinics, and custodial institutions or farms either in connection with other facilities for the diagnosis, classification, hospitalization, confinement, and treatment of alcoholics or independently. The bill also provided for the voluntary admission of alcoholics and the civil commitment of alcoholics to approved institutions by the courts. It was not reported out of committee.

In October 1949, the same groups proposed a bill creating a New York State Commission on Alcoholism along the lines of the Connecticut State Commission, directed to establish and operate information centers and clinics and to

arrange with existing hospitals to receive alcoholics for short-term treatment. It also provided a simple procedure for voluntary admissions and court commitments of alcoholics to hospitals, to the commission itself, and to members or groups of Alcoholics Anonymous. This bill was never introduced. Some objected that extensive additional facilities for long-term commitment of alcoholics were needed. So further time was wasted.

In 1952, the same interested groups retreated to the position of requesting simply a temporary commission to study the problem and report to the legislature. This time the objection was that the subject had been investigated enough and what was needed now was action. Finally, on March 31, 1952, a first step was achieved in the enactment of the Mitchell-Ten Eyck bill, ch. 354, L. 1952. It provided that the Commission on Mental Health in cooperation with the State departments of health and mental hygiene formulate a program to provide for the diagnosis, treatment, and rehabilitation of chronic alcoholics by public and private community agencies and authorized a study of the problems relating to alcoholism in conjunction with such a program. Appropriations aggregating $145,000 were made to carry out the purposes of the bill—$100,000 for services and $45,000 for research.

Under this bill the local government has primary responsibility for initiating and operating the services on a matching 50-percent basis for the cost of operation. The State supplies in addition consultant and supervisory services.

New Clinical Services

Modest progress has been made in setting up a number of outpatient clinics under the program, but these are not open to voluntary patients. The University of Buffalo Alcoholic Rehabilitation Center, opened in 1948 as previously mentioned, expanded its work under the program in association with the Meyer Memorial Hospital. Another clinic, in addition to the one opened in 1949 at the Rochester Health Bureau, was established in the Rochester City Hospital. The University of Rochester sociology department is making a penitentiary research study of men committed to Monroe County jail. New clinics were set up in Syracuse, in Binghamton, at the New York State University College of Medicine on Long Island, and in the home term court of the New York City magistrates' court. Further clinics in New York have been proposed.

Under the dollar matching by local resources, New York State's expenditure for clinical services from March 1952 to March 1954 was $42,499; an additional $27,305 was spent for research and administration. The 1955 allocation for services is $69,303 and for research, $39,458. It is possible that too much of the clinical service is research-motivated, but, if so, that is in line with the purposes of the legislation.

Recommendations

In the light of this history, the New York State Bar Association's committee report, which evoked this discussion, recommends: (*a*) that the State's program be expanded and accelerated; (*b*) that hospitals be encouraged to provide treatment facilities, medical schools provide research and training, and qualified medical personnel participate in and advance the program in closer cooperation with voluntary agencies for group therapy; and (*c*) that a keener awareness be aroused in local governments and health institutions concerning their responsibility for establishing and operating adequate facilities for rehabilitation.

For those who seek more specific guidance, these are the recommendations offered in 1947 by the Research Council on the Problems of Alcohol:

1. Problem drinkers suffering acute physical or mental damage should be admitted to general hospitals, mental hospitals, or other institutions.

2. Mental hospitals should accept directly or by referral from general hospitals symptomatic problem drinkers, that is, the psychotic. Farms and industrial colonies should be established for seriously deteriorated problem drinkers who have physical or mental damage.

3. Custody and care of alcoholics should be transferred from the police to public health agencies.

4. Facilities for treatment should be estab-

lished in the hospitals affiliated with medical schools so as to permit research and training of personnel.

5. Thoroughgoing research should be made into the causes, mechanism, and possible cures for alcoholism.

Support is warranted especially for the following recommendations of the New York State Bar Association: arrest, treatment, or punishment where over-use of alcohol is a factor; examination of the relationship to automobile accidents of over-use of alcohol by driver and pedestrian; acceptance of insurance companies of alcoholism as an insurable risk; more public education.

The New York State Bar Association attributes a want of fulfillment in the field of alcoholic rehabilitation to lack of medical interest and a failure of localities to initiate badly needed facilities. But the legal profession shares responsibility for a solution with every other available profession, organization, or agency, State and local, government and private. The failure to move cannot be ascribed alone to the local section for "a heavy share in the snail's pace of the attack on alcoholism." If New York City must accept full responsibility for the Hart Island action, so, also, must State legislators, hospitals, and physicians acknowledge their own obligations. The State's function must be spelled out. Selden D. Bacon says (*6*): "That the State has a responsibility to fulfill in the control of alcoholism as an extensive public health problem is a belief which has spread widely in recent years." This should not be open to question however broad may be the disagreement on the legislation proposed.

There appears to be a broad distribution of obligations of leadership in government. In the first instance, the State may bear the duty of legislating a full-scale program, although in many States the leadership may come from a few progressive towns. Whether or not they exercise initiative and leadership, cities and counties share in building a program. When State legislation is enacted, the localities can do their part more readily. The cost may be shared but that does not relieve the State of developing leadership which is centralized and firm rather than haphazard and dependent upon the uncertain direction in which individual localities move. In this social program, society is equated with the State. Many States have accepted such responsibility, going from simple surveys to well-established programs. Examples of well-integrated programs are found in Connecticut, Virginia, and Wisconsin.

10-Point Program

As a basis of discussion, the following 10-point program is offered with particular regard for the potentials of a rich State with broad resources.

1. Set up screening facilities in classification centers staffed by physicians, social investigators, probation officers of local departments, welfare workers, correction and police officers, and court officials. Start here. Identify. Examine. Diagnose. Give the data to the judge. Screen out the chronic alcoholics and take them off the streets and into institutions.

2. With the aid of screening material, the judge could usefully release some on probation on condition that alcoholics with a chance of rehabilitation go to the outpatient clinics such as those established under New York's Mitchell-Ten Eyck law. Make these clinics available to persons voluntarily seeking help and correlate them with the screening facilities.

3. Activate institutions such as the short-lived experiment at Hart Island.

4. Educate personnel in correctional institutions about the handling and treatment of alcoholics through inservice training programs and select more specialized personnel.

5. Set up a followup system to reduce jail repeaters. Cooperation among public health authorities, the Salvation Army, and Alcoholics Anonymous may save duplication in this respect. This system will provide case histories for screening facilities for clinics and courts.

6. Establish public farms on a self-supporting basis. They are cheaper than urban jails. Those who can afford it should go to private farms. Many States have established such farms with State and local aid. Although this point is the center of much controversy, my personal conviction is that the system is valid.

It seems to me that farms and industrial colonies are essential for seriously deteriorated problem drinkers and those needing long-term treatment. California has established a State colony. The Hart Island colony of New York City's East River was showing success. Although the Connecticut farm was closed in 1941, the report to the governor declared the idea sound (*6*).

Such institutions have distinct advantages. They isolate patients from congested areas; they eliminate the possibility of running down local metropolitan sections; they have a lower capital and operating cost than county or city jails or hospitals; they provide better moral and physical rehabilitation possibilities; and they afford opportunities to revive farm and other skills.

Haggard and Jellinek (*5*) state, "Hospitals or farms for inebriates must be equipped to classify the various types of inebriates according to the causes of their condition." Hirsh (*7*) says, "When we have learned to utilize our present facilities we might then go on and consider the construction of new ones, such as farms and industrial colonies for seriously deteriorated drinkers who present special and particularly severe problems of treatment and rehabilitation."

7. Empower judges to deal with persons having an alcoholic problem beyond their control under a civil rather than a criminal statute. Even rehabilitation-minded magistrates are now handcuffed to penal statutes.

8. Ultimately there must be a civil commitment procedure. When colonies or farms are set up, procedures can be established for commitment to these institutions on a voluntary and involuntary basis. Many States have commitment laws. In 1951, Georgia provided for both voluntary and involuntary commitment of alcoholics for treatment. In Connecticut, the probate court may commit a habitual drunkard or dipsomaniac or persons so addicted to the intemperate use of narcotics or stimulants that they have lost the power of self-control. California law allows commitment of alcoholics who are unable to transact ordinary business or who endanger themselves or so impoverish themselves as to require charitable aid or who are in danger of becoming degrading or detrimental influences upon their families or others. The longest, most successful program and the best facilities for dealing with the program and treating the alcoholics are found in Sweden, where there are places for voluntary treatment and for court commitment.

For New York State, the principle of compulsory commitment of alcoholics to privately licensed institutions was affirmed under section 201 of the mental hygiene law. But principle is not practice. The principle of commitment should not depend on ability to pay the high cost of private treatment. Nor should it be thwarted by the private institution's legitimate fear of a suit for false imprisonment.

9. We know what to do. Bridge the gap between what we know and what we do. Should expense be thrown up as a blockade to action, money must be provided by imaginative budget makers. Many States have done it, some by allocating a percentage of liquor license fees to separate administrations for rehabilitation.

10. In the meantime, general hospitals must admit drunkards suffering acute physical or mental damage. Mental hospitals must accept psychotic problem drinkers.

The legal and health system of the State must be prodded into accomplishment so that it will not fail in this crucial problem. We must care to cure.

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Deserving of wider recognition is the relationship between marine animal life and water conditions in harbors, bays, and estuaries into which industrial wastes and domestic sewage are discharged. A step in this direction is this study of the Los Angeles and Long Beach Harbors.

The Relation of Polychaetous Annelids to Harbor Pollution

By DONALD J. REISH, Ph.D.

NO EXTENSIVE investigations of the role of animals in areas of marine pollution have been carried out in waters of the United States, although there have been a few European studies of interest (*1–3*). Blegvad (*3*) has stated that some species of polychaetes flourish well near domestic outfall sewers in Copenhagen Harbor. Filice (*4*) was able to divide the bottom fauna into three zones in a polluted arm of San Francisco Bay.

The seasonal and quantitative aspects of the relationship between bottom-dwelling animals and pollution in a bay or harbor has not been studied previously. This study, which was undertaken in 1954, examines these seasonal and quantitative aspects and seeks possible indicator organisms or animal associations.

At this time only representative material is published to indicate some of the general findings about the relationship of benthic polychaetous annelids to zones of pollution in Los Angeles-Long Beach Harbors. Emphasis has been placed upon the polychaetous annelids since they were the bottom-dwelling animal forms most commonly encountered in the 1951 harbor pollution survey conducted by the Los Angeles Regional Water Pollution Control Board (*5*).

Dr. Reish, research associate, department of biology, University of Southern California, has been studying the biology of estuaries, bays, and harbors since 1950. *Because the complete data of the 1954 survey of Los Angeles-Long Beach Harbors are too voluminous to be included in this general summary, they will be published in monograph form.*

Materials and Methods

Los Angeles and Long Beach Harbors are one harbor oceanographically. For convenience of discussion in this study, the harbors have been divided into inner and outer harbors. The outer harbors are considered generally to be the area south of Terminal Island (see map).

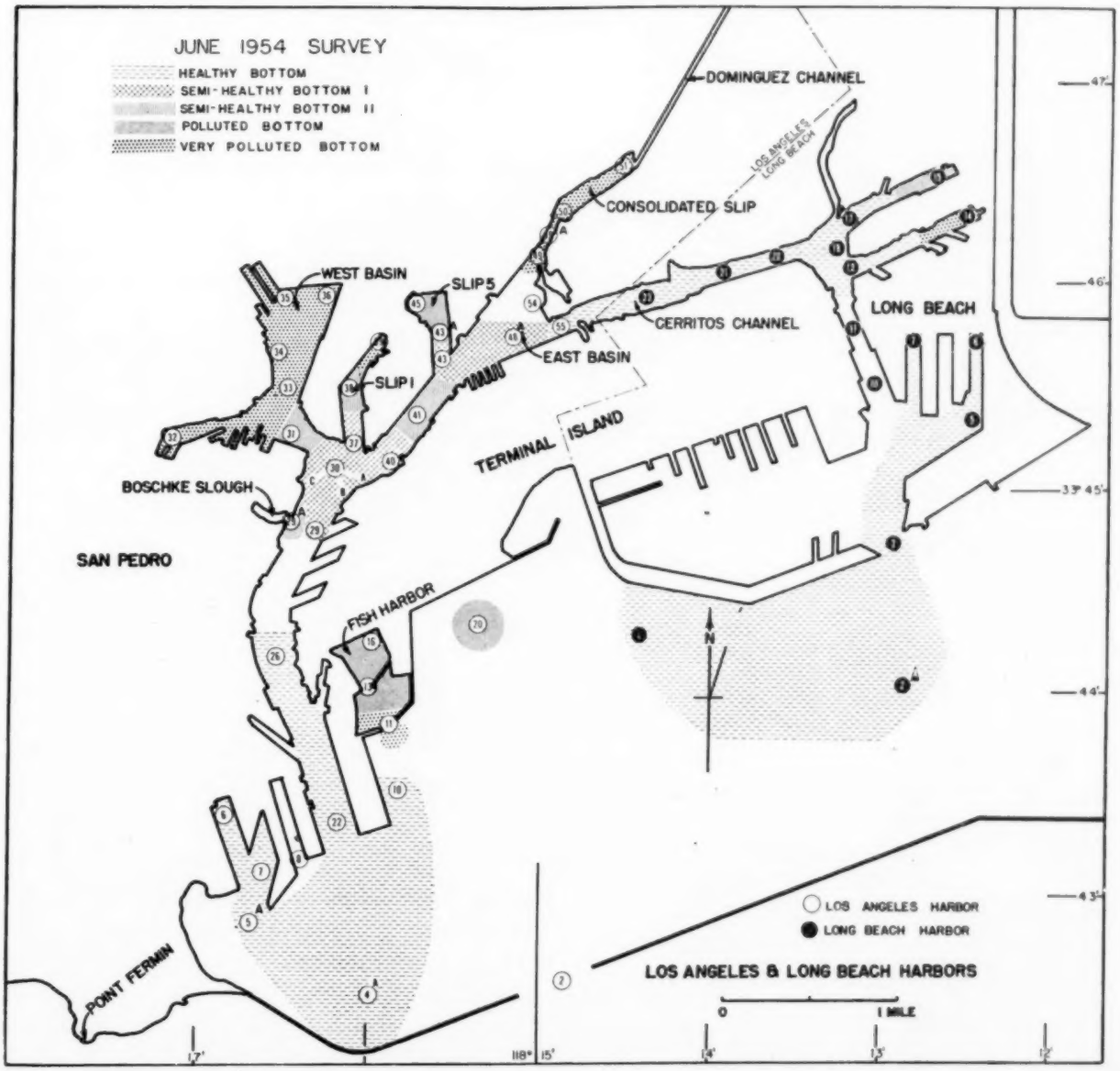
Many types of wastes are discharged into these harbors. The sources of these discharges have been described in the report (*5*) of the Los Angeles Regional Water Pollution Control Board No. 4. They may be grouped into the following seven general categories: fish canneries; oil refineries; chemical plants; vegetable oil plants; creosoting and pile-treating plants; metalworking shops, repair shops, and shipbuilding yards; domestic sewage.

It is important to distinguish between the dictionary definition of the word "pollution" and the California legislative definition of pollution. The dictionary definition, which is em-

ployed in this study, is the act of making or rendering unclean, whereas in division 7 of the water code of the State of California, under which the State and regional water pollution control boards operate, pollution means "an impairment of the quality of the waters of the State by sewage or industrial waste to a degree which does not create an actual hazard to the public health but which does adversely and unreasonably affect such waters for domestic, agricultural, navigational, recreational or other beneficial use."

Three surveys of the harbors were made during 1954; the first was on January 6–7, the second on June 14–15, and the third on November 18–19. In each survey the water mass and substrate at 55 stations in the harbors were sampled as to physical, chemical, and biological characteristics, with the assistance of the Los Angeles Harbor Department and the California State Department of Fish and Game. The sampling stations were in much the same location as the stations described in the 1951 survey (*5*). The station numbering system used in 1954 follows that of the earlier survey; however, not all of the 1951 stations were used and

Bottom conditions in Los Angeles-Long Beach Harbors, June 1954.



Courtesy of Dr. John L. Mohr.

The trigger (arrow) is set on this No. 1 size Hayward orange-peel bucket used in the pollution surveys of Los Angeles and Long Beach Harbors.

some new stations were added. The stations within Los Angeles Harbor are designated LA–2, LA–4A, and so on (shown as stations 2 and 4A in white circles on the map), and stations within Long Beach Harbor are LB–1, LB–2, and so on (shown as 1 and 2 in black circles).

Samples of the water mass taken at the surface and at a 20-foot depth were analyzed for dissolved oxygen concentration, chlorinity, and pH. One bottom sample was taken at each station with a Hayward orange-peel bucket (pictured). The bucket samples an area of 100 square inches and, depending on the nature of the material, holds as much as a gallon.

Part of the sample material was set aside for later determination of carbon and nitrogen content. The remainder was screened through a wire mesh with 20 openings to the inch. This size of screen was convenient to use since it retains the animals and enables screening to be done in the work boats at the station. The material retained on the screen was preserved in formaldehyde. More details about methods are described in the pollution study Reish and Winter (*6*) made of Alamitos Bay, Calif.

Distribution of Animal Species

Insofar as possible, identification of the bottom-dwelling animals has been completed for the January and June 1954 surveys. Seventy different animal species have been identified: 45 species were polychaetes, 10 were pelecypods, and 5 were gastropods; and the remaining 10 species included coelenterates, turbellarians, nemerteans, oligochaetes, crustaceans, phoronids, and echinoderms.

The distribution of the polychaetes was plotted and correlated with bottom conditions in Los Angeles-Long Beach Harbors. On this basis the harbors can be divided into 5 ecologic areas, categorized below as healthy bottom, 2 types of semihealthy bottom, polluted bottom, and very polluted bottom. The zones of pollution, which of course varied for the three surveys, are shown on the map of the June 1954 survey. The physical, chemical, and biological characteristics of samples taken from the five areas are shown in table 1.

The white areas in the channel and harbor portions shown on the map did not fall into the categories of pollution for varying reasons:

Most of the outer harbors and that part of the channel between sampling stations LA–26 and LA–29 were not sampled.

Although the areas at stations LB–10 and LB–11 were sampled, dredging operations were recently completed.

The animals found in the sample from station LA–54 were atypical with reference to other sampling stations.

Healthy Bottom

The healthy bottom zone was characterized by the polychaete species *Tharyx parvus* Berkeley, *Cossura* sp., and *Nereis procera* Ehlers. The zone was found in both Los Angeles and Long Beach Harbors and in much of the inner harbor of Long Beach.

Table 1. Physical, chemical, and biological characteristics of samples of each of the 5 ecologic areas based on surveys of bottom conditions in Los Angeles and Long Beach Harbors

Characteristic	Healthy bottom [1]	Semihealthy bottom I [2]	Semihealthy bottom II [3]	Polluted bottom [4]	Very polluted bottom [5]
Dissolved oxygen (p.p.m.)					
Surface	7.3	3.6	4.5	8.4	0.0.
Deep	7.4	4.4	3.6	6.6	2.3.
Chlorinity (0/00)					
Surface	19.4	19.2	19.4	19.3	19.0.
Deep	19.5	19.3	19.2	19.6	19.7.
pH					
Surface	Not taken	7.5	7.4	7.6	7.7.
Deep	do	7.5	7.6	7.6	7.6.
Substrate	do	7.0	7.5	7.5	7.1.
Nature of substrate	Gray mud	Black sulfide mud.	Black sulfide mud.	Black sulfide mud; 3 qts. fish scales.	Black mud; petroleum odor.
Animals [6]					
Polychaetes	*Tharyx parvus* (18); *Cossura* sp. (11); *Nereis procera* (2); *Scalibregma inflatum* (1); *Prionospio pinnata* (2); *Lumbrineris minima* (3); *Amphicteis scaphobranchiata* (2)	*Polydora paucibranchiata* (13); *Neanthes caudata* (9); *Dorvillea articulata* (7); *Lumbrineris erecta* (1); *Capitella capitata* (2)	*Cirriformia luxuriosa* (272); *Polydora paucibranchiata* (7); *Dorvillea articulata* (4); *Neanthes caudata* (1); *Capitella capitata* (1)	*Capitella capitata* (53); *Dorvillea articulata* (8); *Podarke pugettensis* (1)	None present.
Pelecypods	*Tellina buttoni* (3)	*Tellina buttoni* (5)	*Macoma nasuta* (3)		
Coelenterate	*Stylatula elongata* (1)				
Crustacean		*Epinebalia* sp. (1)			
Unidentified	Nemertean (1); Ophiuroid (1)	Oligochaetes (4)	Phoronid (1)		

[1] Station LB–1, January 1954. [2] Station LA–30B, June 1954. [3] Station LA–29A, June 1954. [4] Station LA–16, June 1954. [5] Station LA–49A, June 1954. [6] Figures within parentheses indicate number of specimens present in 1 sample.

An average of 10 animal species were present; 7 were polychaetes.

The dissolved oxygen content of the surface water and of the water at 20 feet averaged more than 6.0 p.p.m.

The substrate was typically a fine, gray-colored mud.

Semihealthy Bottom I

Two apparently distinct semihealthy zones exist principally in the main channels of Los Angeles Harbor. The main difference is in the type of animal life found; the differences in the physical and chemical characteristics of these zones were minor. The first of these semihealthy bottom areas was marked by the presence of *Polydora* (Carazzia) *paucibranchiata* Okuda and *Dorvillea articulata* (Hartman).

An average of 7 animal species were found; 5 were polychaetes.

The average dissolved oxygen reading of the water was 2.5 p.p.m. at the surface and 3.2 at 20 feet.

Fine mud, shell fragments, sand, fish scales, or black mud possessing a sulfide odor were among the variety of substrate types observed.

Semihealthy Bottom II

The recognition of a second semihealthy zone was occasioned by the presence of large num-

bers of the polychaete *Cirriformia luxuriosa* (Moore). This species of polychaete is particularly noticeable since it frequently attains a length of 15 centimeters, as measured in preserved condition. Otherwise, the number of animal species present, the chemical and physical characteristics, and the nature of the substrate were essentially the same in this second semihealthy zone as in the other semihealthy bottom area.

Sampling station LA–29A is given in table 1 as an example of this zone, which was found only within a portion of Los Angeles inner harbor. However, the 272 specimens of *C. luxuriosa* listed for semihealthy bottom II is unusually high. A more typical number would be around 80.

Polluted Bottom

The areas of polluted bottom were characterized by an average of 3 animal species, 2 of which were polychaetes. One of the polychaete species, *Capitella capitata* (Fabricius), was always present and frequently in large numbers. Fishery wastes or domestic sewage was being discharged near the sampling stations where the largest numbers of *C. capitata* were found. The polluted bottom zone was found usually within the slips except in the outer harbors where it was found on two occasions about the Terminal Island outfall sewer and on one occasion near the Fish Harbor outfall sewer.

Both at the surface and at 20 feet, the average dissolved oxygen content of the water was 3.5 p.p.m. This concentration was higher than that observed for the two semihealthy zones.

The substrate was a black mud with a sulfide odor.

Very Polluted Bottom

No animal life was present in the very polluted bottom areas, which are characterized by sludge beds. Sludge beds are an accumulation of toxic waste discharges to such an extent as to have killed the organisms living in the bottom and to exclude the introduction of organisms from other areas.

The inner reaches of some of the slips in the harbors had a very polluted bottom, but the areas in which no life existed were not observed in the main channels or in the outer harbors except once during the November 1954 survey near the Terminal Island outfall sewer. The sources of pollution may be of domestic origin or of industrial origin, from oil refinery wastes for example.

The dissolved oxygen content was an average 1.6 p.p.m. at the surface and 2.2 p.p.m. at 20 feet below the surface.

The substrate consisted of black mud which had either a sulfide or petroleum odor.

Descriptive of Actual Conditions

While the general designation of the harbor bottom zones as healthy bottom, semihealthy bottom, polluted bottom, and very polluted bottom is based in part on the distribution of the different species of bottom-dwelling animals, notably the polychaetes, this terminology, adapted from Patrick (*7*), is employed because it is more descriptive of the actual conditions than are the scientific names of the principal species. Each type of bottom is characterized by one or more species of polychaetes, which, within limits, may serve as indicator organisms.

The division into zones may suggest well-defined demarcations, but frequently this is not the case with regard to animal distribution. Species characteristic of the healthy bottom are found in smaller numbers within the two semihealthy bottom zones but not within the polluted bottom area. *C. capitata*, the characteristic organism of the polluted bottom, may be present in the semihealthy bottom, but it has not been found in the healthy area. Animals common in the semihealthy bottom may occur in the healthy or polluted areas but again only in smaller numbers.

The most common areas of overlap occur either near the junction of two bottom types or at stations that were not well defined as to type of bottom from survey to survey. The area in slip 5 is an example of overlapping zones. The zone surrounding station LA–45 was classified "polluted" in the January and June surveys and "semihealthy I" in the November survey.

Since a relationship exists between the polychaete population and the degree of pollution in the waters they inhabit, a knowledge of the more prevalent species of polychaetes is desirable. Comparative lengths and ecologic char-

acters of the principal bottom-dwelling species of polychaetes of Long Angeles-Long Beach Harbors are given in table 2, which also includes geographic distribution and references to published material describing the species.

Seasonal Distribution

Little seasonal variation in the distribution of the animals was found during the three 1954 surveys. In general, the results of this aspect of the study are similar to the findings of the 1951 survey. Some variations are worthy of mention, however.

In 1951 the very polluted bottom zone extended into the East Basin of Los Angeles Harbor to about the level of station LA–54. The sludge beds characterizing this area in 1951 were removed in 1953 when the East Basin and a portion of the consolidated slip were dredged in order to deepen the Dominguez Channel for shipping. Although animals were found in the bottom area around stations LA–49, LA–49A, and LA–50 in the January 1954 survey, no animals were taken from these stations in the June survey. By November the sludge beds had again advanced into the East Basin to include station LA–54.

Checking upon the enroachment of sludge beds into previously productive biological beds is of particular importance to water pollution control. *C. capitata*, which was particularly abundant near regions of pollution of biological origin in the Los Angeles-Long Beach Harbors, has been found elsewhere in southern California bay areas:

Reish and Winter (*6*) found the animal in two different areas of Alamitos Bay. One area is in the vicinity of a public dump, but the other is not near any known source of pollution.

Unpublished data yields the information that *C. capitata* is also present in the lower San Gabriel River, which receives waste discharges of both industrial and domestic origin, and in Newport Bay, too, where it has been found only near fish cannery outfall sewers.

Additional data relating *C. capitata* to pollution is given by Filice (*4*), who found the animal near industrial and waste discharges in San Pablo Bay, an arm of San Francisco Bay. The further correlation of *C. capitata* with sources of pollution, particularly of biological origin, would be of value.

Comparisons of the fauna and bottom of the Los Angeles-Long Beach Harbors with those of Alamitos Bay (*6*) and Newport Bay are of interest since these bays are essentially unpolluted bodies of water in southern California, except as noted. The animals in Alamitos Bay and Newport Bay are diversified and similar to those found in the outer harbors of Los Angeles and Long Beach.

Recently, Hartman (*8*) published the preliminary results of a quantitative survey of the

Table 2. Comparison of the ecology, length, and geographic distribution of the principal benthic polychaetes in Los Angeles and Long Beach Harbors

Species	Type of bottom [1]	Length [2] (cm.)	Habitat	Geographic distribution	Reference list
Tharyx parvus	Healthy	2. 5	Burrows in substrate	Vancouver Island, San Francisco Bay, Southern California.	8, 9, 10.
Cossura sp	do	1. 5	do	Southern California	Undescribed species.
Nereis procera	do	9. 0	do	British Columbia to California.	11.
Polydora (Carazzia) *paucibranchiata.*	Semihealthy	1. 5	Builds mud tubes	Japan, California	6, 12.
Dorvillea articulata	do	2. 0	Crawls on surface of substrate or burrows in substrate.	Oregon to western Mexico.	13, 14.
Cirriformia luxuriosa	do	15. 0	Burrows in substrate	California	10.
Capitella capitata	Polluted	3. 0	do	Cosmopolitan	9.

[1] In Los Angeles and Long Beach Harbors. [2] Maximum observed length of preserved specimens.

benthos of the San Pedro Basin—the area between Los Angeles-Long Beach Harbors and Santa Catalina Island. Two of the 5 stations sampled within the 2 harbors have been analyzed. These two stations were located near stations LA–4A and LB–1. A Hayward orange-peel bucket was used to sample an area of 2.8 square feet. Although the number of specimens and species was greater, as reported by Hartman, the results indicated a healthy bottom condition with *T. parvus* predominating.

Summary

A physical, chemical, and biological study of 55 sampling stations made 3 times during 1954 in Los Angeles-Long Beach Harbors, Calif., placed emphasis upon bottom organisms, particularly the polychaetous annelids. As a result of the survey, the harbors can be divided into five zones on the basis of bottom conditions and distribution of polychaetes. The zones are:

A healthy bottom area characterized by a large number of polychaete species, with *Tharyx parvus*, *Cossura* sp., and *Nereis procera* predominating.

A semihealthy bottom area, with *Polydora* (Carazzia) *paucibranchiata* and *Dorvillea articulata* predominating.

A second semihealthy bottom area in which *Cirriformia luxuriosa* predominates.

A polluted bottom area, with *Capitella capitata* predominating.

A very polluted bottom area in which there is no animal life.

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How the Public Health Worker Feels About His Job

By EDWARD M. COHART, M.D., WILLIAM R. WILLARD, M.D., and VIRGINIA R. MARR, M.P.H.

THE public health worker's feelings about his job—his satisfactions and his dissatisfactions—was one of several areas of study included in the Yale Public Health Personnel Research Project, which sought to provide information that would be useful in improving public health administration. For this portion of the project, 1,098 professional and semiprofessional workers in selected public health agencies were interviewed. The agencies included the State health departments of Connecticut, Maryland, and Michigan, several county health departments and visiting nurse associations in these States, and one large county health department in New York. The sampling process and the interview techniques are described in the May 1955 *Public Health Reports*, pages 447–452. Since the development of a method proved to be equally as important in this project as the collection of data, the findings demonstrate both the use of the method and certain attitudes characteristic of public health workers.

The satisfactions and dissatisfactions expressed by the workers fell quite naturally into four categories.

First, there was a like or dislike for public health in general. Remarks such as "I enjoy public health work," "I get a feeling of accomplishment in public health," and "I find public health work satisfying," or "I dislike public health work," "I cannot use my previous training and experience in public health," and "I cannot see any results in public health" were classified in this group. The term "public health in general" defies exact definition. Obviously, the worker's concept of public health has been conditioned by his own experiences; had his experiences been other than what they were, his concept of public health might have been different.

The second major category concerned salary and job security. It included such individual items as salary, provisions for retirement and pensions, tenure, and opportunities for advancement.

Recognition and appreciation in the agency, a "feeling of belonging," and relationships with co-workers composed a third group, which was called status in the agency and interpersonal relations.

The fourth category, labeled conditions of work, related to such factors as working hours, working facilities, amount of clerical work, place of work (in the office or in the field), phys-

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ical demands of the job, and freedom and responsibility to make decisions.

In considering the data presented in the following pages, it should be remembered that the agencies studied were selected as better-than-average organizations and consequently may not be representative of all agencies. Rather detailed data are presented in the tables, but many of the findings are not discussed because the information necessary to proper evaluation is not available to the authors, inasmuch as the Yale study did not encompass case studies of individual health agencies; because many of the subgroups of workers are too small for valid generalizations; and because the need for keeping the report within a reasonable length precludes extensive discussion.

Satisfactions and Dissatisfactions

Sixty percent of the public health workers interviewed in this study said that they were happy with their work, even though some of them mentioned dissatisfaction with specific aspects of their jobs (table 1). Thirty-eight percent liked the conditions under which they worked; 32 percent found pleasure in their relations with their associates or in the recognition they received in the agency; and 22 percent expressed satisfaction with salary or job security.

Dissatisfaction was encountered most frequently in relation to the conditions of work, about which 33 percent of the workers were unhappy. Twenty-five percent were not satisfied with salary or job security, and 15 percent complained about their lack of status or their unsatisfactory relations with associates. Fourteen percent of the workers were dissatisfied with public health work generally.

The frequency of expressions of satisfaction varied somewhat with position in the administrative hierarchy and the governmental level of the agency. Notably the percentage of State health department staff workers (includes both junior and senior staffs) who expressed satisfaction with public health work was lower than the percentage of any other group. Associated with this was the fact that a lower percentage of State staff personnel than of any other group spoke of enjoying their status in the agency or their relations with associates. Furthermore, satisfaction with working conditions was expressed less frequently by State workers, regardless of administrative level. Only with respect to salary and job security did a greater proportion of State than of local personnel express satisfaction.

With one exception, there were no important differences related to governmental or administrative level in the expression of dissatisfactions. The exception concerned salary and job security, with which relatively few high-echelon personnel (includes all personnel of supervisor and higher rank) in State health departments were dissatisfied.

Public Health in General

Varying percentages of the workers expressed no feelings, one way or the other, about public health work in general. However, between 12 and 15 percent were unhappy with public health, and about two-thirds of the high-echelon personnel in State and local jurisdictions and of staff personnel in local agencies and 43 percent of the staff personnel in State health departments expressed satisfaction with public health (table 2).

The low proportion of workers among State staff personnel expressing satisfaction can be attributed primarily to the fact that a relatively small proportion of laboratory staff personnel in State health departments appear to be happy in public health, and such personnel constitute a large segment of the State staff workers. The feelings of the staff laboratory workers in State health departments are in striking contrast to those of the staff laboratory workers in the local health departments. Medical and statistics staff personnel in State health departments also showed relatively little enthusiasm for public health.

Salary and Job Security

About half of the workers were noncommittal about salary and job security, and the remainder were almost evenly divided in expressing satisfaction and dissatisfaction with these aspects of their jobs (table 3).

Dissatisfaction centered upon salary. Staff

Table 1. Satisfactions and dissatisfactions of State and local public health workers [1]

Administrative and governmental level	Number of workers	Percent expressing satisfaction with—				Percent expressing dissatisfaction with—			
		Public health work in general	Salary and job security	Status and interpersonal relations	Working conditions	Public health work in general	Salary and job security	Status and interpersonal relations	Working conditions
Staff									
Local	482	67	14	35	42	15	29	14	31
State	302	43	33	24	29	14	29	19	32
High-echelon									
Local	153	66	20	37	46	12	22	18	40
State	161	63	30	35	32	12	10	12	34
Total	1,098	60	22	32	38	14	25	15	33

[1] Includes workers in visiting nurse associations.

Table 2. Feelings of health department personnel [1] about public health work

Governmental level and service	Staff			High-echelon		
	Number	Percent dissatisfied	Percent satisfied	Number	Percent dissatisfied	Percent satisfied
Local	**482**	**15**	**67**	**153**	**12**	**66**
Medical	5	20	60	36	17	58
Nursing	349	16	70	78	8	69
Sanitation	84	16	57	15	20	67
Laboratory	19	16	95	8	12	50
Health education	6	0	50	3	0	67
Statistics	6	17	33	0		
Administration	0			4	0	100
Other	13	8	54	9	22	67
State	**302**	**14**	**43**	**161**	**12**	**63**
Medical	15	13	27	31	19	61
Nursing	14	0	100	27	15	56
Sanitation	47	13	81	27	11	82
Laboratory	158	15	37	23	17	52
Health education	7	0	0	5	0	20
Statistics	21	5	29	10	10	90
Administration	3	33	67	11	0	45
Other	37	27	24	27	4	70

[1] Includes personnel in visiting nurse associations.

workers in State health departments also complained about the lack of opportunities for advancement. The expression of dissatisfaction with retirement plans and pensions and tenure was minimal.

Except for high-echelon personnel in State health departments, only 7 percent of whom considered their salary inadequate, roughly 20 percent of the workers were dissatisfied with their salaries. In the local health departments, a relatively high proportion of sanitation personnel at both administrative levels complained about salary. In the State health departments, staff nurses were most concerned.

Nineteen percent of the staff workers in State health departments, as compared to 3 percent of other public health workers, were unhappy about the lack of opportunities for advancement. Sanitation and laboratory staff personnel in State health departments were largely responsible for this high proportion.

On the positive side, almost equal percentages

expressed satisfaction with salary, retirement plans and pensions, and tenure. A relatively small number praised the opportunities for advancement.

About 10 percent of the workers felt that their salaries were good: The proportion was somewhat higher for State than for local personnel and for workers at the higher administrative levels than for staff workers. The difference between State and local personnel was particularly noticeable in the sanitation service, where more State workers at both administrative levels than their counterparts in local health departments appeared to be satisfied with their salaries. Furthermore, among high-echelon personnel in the State health departments, satisfaction with salary was more common among sanitation personnel than among

Table 3. Feelings of health department personnel [1] about salary and job security

Position and service	Number	Percent dissatisfied with—					Percent satisfied with—				
		Any aspect of salary and job security [2]	Salary	Retirement and pensions	Tenure	Opportunities for advancement	Any aspect of salary and job security [2]	Salary	Retirement and penions	Tenure	Opportunities for advancement
Staff											
Local	**482**	**29**	**23**	**1**	**1**	**3**	**14**	**6**	**4**	**6**	**4**
Medical	5	40	40	0	0	0	0	0	0	0	0
Nursing	349	22	15	1	0	3	15	6	3	7	5
Sanitation	84	52	50	2	2	5	8	4	4	4	0
Laboratory	19	20	10	0	0	10	10	5	0	0	5
Health education	6	33	17	0	17	0	17	17	0	0	0
Statistics	6	17	17	0	0	0	33	0	17	17	0
Administration	0										
Other	13	38	38	0	0	0	38	23	31	23	8
State	**302**	**29**	**20**	**4**	**1**	**19**	**33**	**13**	**19**	**15**	**4**
Medical	15	0	0	0	0	0	0	0	0	0	0
Nursing	14	57	57	0	0	0	21	0	0	7	0
Sanitation	47	43	34	8	2	34	55	21	43	45	4
Laboratory	158	30	15	2	1	22	32	10	17	12	5
Health education	7	0	0	0	0	0	14	0	0	14	0
Statistics	21	19	14	0	0	10	43	19	43	5	10
Administration	3	67	33	0	0	33	67	33	33	67	33
Other	37	27	27	14	0	14	24	19	0	0	0
High-echelon											
Local	**153**	**22**	**20**	**1**	**3**	**5**	**20**	**11**	**12**	**8**	**5**
Medical	36	17	14	0	6	6	22	19	14	8	0
Nursing	78	17	14	0	0	2	17	9	13	9	6
Sanitation	15	47	47	0	0	13	33	0	20	20	7
Laboratory	8	50	50	12	0	12	25	25	12	0	0
Health education	3	0	0	0	0	0	33	33	0	0	0
Statistics	0										
Administration	4	50	50	0	25	25	0	0	0	0	0
Other	9	22	22	0	11	0	11	0	0	0	11
State	**161**	**10**	**7**	**1**	**2**	**2**	**30**	**16**	**19**	**14**	**5**
Medical	31	6	3	0	3	0	23	6	13	3	3
Nursing	27	7	4	4	4	0	7	0	0	7	0
Sanitation	27	7	7	0	0	0	52	37	52	48	11
Laboratory	23	22	22	0	0	4	44	22	35	17	9
Health education	5	0	0	0	0	0	0	0	0	0	0
Statistics	10	0	0	0	0	0	50	10	30	10	10
Administration	11	27	0	0	0	27	18	9	9	0	0
Other	27	11	7	0	4	0	30	22	4	4	4

[1] Includes personnel in visiting nurse associations.
[2] Includes an occasional individual not included in the subcategories listed.

personnel of the medical and nursing services.

As with salaries, appreciation of retirement and pension plans and of tenure was expressed more often by State than by local and by high-echelon than by staff personnel. Here again, a larger proportion of State than of local sanitation personnel and, to a lesser extent, a larger proportion of State than of local laboratory personnel, appeared satisfied with these benefits. The proportions among State sanitation and laboratory personnel were also greater than the proportions among State medical and nursing personnel.

Agency Status and Interpersonal Relations

Fifteen percent of the workers were dissatisfied with their status in the agency and their

Table 4. Feelings of health department personnel [1] about status in the agency and interpersonal relations

Position and service	Number	Percent dissatisfied with—				Percent satisfied with—			
		Any aspect of interpersonal relations and status [2]	Interpersonal relations	Recognition and appreciation	Feeling of belonging	Any aspect of interpersonal relations and status [2]	Interpersonal relations	Recognition and appreciation	Feeling of belonging
Staff									
Local	**482**	**14**	**3**	**9**	**3**	**35**	**31**	**9**	**16**
Medical	5	0	0	0	0	0	0	0	0
Nursing	349	14	2	10	2	40	35	10	16
Sanitation	84	7	4	1	0	24	21	2	16
Laboratory	19	16	0	10	10	21	21	5	10
Health education	6	33	17	33	33	0	0	0	0
Statistics	6	17	17	0	0	33	0	0	33
Administration	0								
Other	13	31	15	23	15	31	31	23	23
State	**302**	**19**	**0**	**16**	**10**	**24**	**24**	**10**	**10**
Medical	15	0	0	0	0	7	7	0	0
Nursing	14	0	0	0	0	7	7	7	7
Sanitation	47	21	0	19	6	62	62	30	43
Laboratory	158	19	0	16	10	17	17	5	2
Health education	7	29	14	29	14	14	14	0	0
Statistics	21	0	0	0	0	38	33	19	19
Administration	3	0	0	0	0	67	67	67	67
Other	37	40	0	35	27	8	8	3	3
High-echelon									
Local	**153**	**18**	**6**	**11**	**3**	**37**	**33**	**15**	**12**
Medical	36	14	14	6	3	30	28	14	6
Nursing	78	17	1	13	2	40	38	17	14
Sanitation	15	27	7	13	0	40	27	13	13
Laboratory	8	25	0	12	12	38	38	25	25
Health education	3	0	0	0	0	0	0	0	0
Statistics	0								
Administration	4	25	0	25	0	75	50	0	25
Other	9	33	22	11	0	22	22	11	11
State	**161**	**12**	**2**	**7**	**4**	**35**	**31**	**16**	**14**
Medical	31	6	3	3	0	29	23	13	13
Nursing	27	4	0	0	0	30	30	4	7
Sanitation	27	7	0	4	4	82	74	48	37
Laboratory	23	22	4	9	13	39	26	13	9
Health education	5	20	0	20	0	20	20	0	0
Statistics	10	10	0	0	0	20	20	20	20
Administration	11	0	0	0	0	9	0	9	0
Other	27	26	4	26	7	15	15	4	7

[1] Includes personnel in visiting nurse associations.
[2] Includes an occasional individual not included in the subcategories listed.

relationships on the job; 32 percent were satisfied; and the remainder had no strong feelings about these aspects of their job (table 4). Although there were no significant differences on the basis of governmental or administrative level with respect to all dissatisfactions in this category, it should be noted that fewer State health department staff personnel than any other comparable group expressed satisfaction with these aspects of their jobs. The only important difference among the services was the high proportion of State sanitation personnel who expressed satisfaction.

The most frequent complaint related to lack of recognition and appreciation in the agency. Eleven percent of the workers made this complaint. It was expressed most often by staff personnel in State health departments, and among these, by sanitation, laboratory, and "other" workers. By contrast, high-echelon personnel in State health departments made this complaint relatively infrequently.

Eleven percent of the workers also expressed satisfaction with the appreciation and recognition given them in their agencies. The proportion was somewhat greater among high-echelon than among staff personnel. It is interesting to note that a relatively high percentage of sanitation personnel in State health departments expressed satisfaction with this feature of their work. The frequency with which sanitation personnel react, either favorably or unfavorably, to the recognition given them might be an indication of the importance which they attach to status.

Five percent of the workers indicated that they missed what can be called a feeling of belonging in their organization. Once again, staff personnel in State health departments were the group that seemed to be the most dissatisfied. Among the services, laboratory personnel were the most prone to make this complaint, although only 10 percent did so.

Fourteen percent of the workers commented that they felt very much a part of the agency. Sanitation personnel in State health departments stood out in this respect.

Dissatisfaction with interpersonal relations was relatively rare; only 2 percent of all personnel voiced this complaint.

On the other hand, nearly 30 percent of the workers felt that their good relationships with co-workers were important enough to mention. Among staff personnel, nurses in local health departments and members of the sanitation service in State health departments seemed particularly appreciative of good working relationships with their colleagues. This was also true of high-echelon personnel in State health departments.

Conditions of Work

One-third of the workers were dissatisfied with one or another of the conditions of their work (table 5). State and local workers, staff and high-echelon personnel, were about equally dissatisfied. Dissatisfaction was greatest among staff laboratory personnel in local health departments and staff sanitation and health education personnel in State health departments.

On the positive side, more than one-third of the workers expressed satisfaction with some aspect of their working conditions. More local than State personnel expressed such satisfaction. The proportion of satisfied sanitation personnel ran somewhat higher than that for the other services. As pointed out previously, a high proportion of State sanitation personnel also expressed dissatisfaction with some aspect of working conditions. It would appear from these findings that sanitation personnel are more sensitive than others to the conditions under which they work.

The greatest number of complaints about working conditions concerned excessive clerical work and inadequate work facilities.

Sixteen percent of the workers were unhappy about what they considered to be excessive clerical work. Such tasks appeared to be most oppressive to high-echelon personnel in local health departments and least oppressive to staff workers in State health departments. Sanitation personnel in State health departments and high-echelon nurses in local health departments were particularly unhappy about their burden of clerical work.

Fourteen percent of the workers complained about inadequate work facilities. State and local workers, regardless of administrative level, had similar proportions. Less than 3 percent

of the workers were inclined to praise the facilities. Laboratory and statistics personnel felt the lack of facilities most keenly.

Six percent of the workers complained of lack of freedom and responsibility in their jobs. Such complaints tended to be more frequent among State staff than local staff personnel. They were voiced most frequently by staff medical personnel in State and local health departments and by staff sanitation personnel in State health departments.

On the other hand, the opportunities for freedom and responsibility which their jobs afforded them were satisfying to 23 percent of the workers. As might be expected from other findings of this study, such feelings were least

Table 5. Feelings of health department personnel[1] about conditions of work

Position and service	Number	Percent dissatisfied with—							Percent satisfied with—					
		Any aspect of work conditions	Lack of freedom and responsibility	Length of working day	Arduous nature of work	Work facilities	Indoor work	Excessive clerical work	Any aspect of work conditions	Opportunities for freedom and responsibility	Length of working day	Easy nature of work	Work facilities	Outdoor work
Staff														
Local	**482**	**31**	**3**	**1**	**2**	**13**	**3**	**18**	**42**	**26**	**21**	**4**	**4**	**11**
Medical	5	40	20	0	0	20	0	20	0	0	0	0	0	0
Nursing	349	32	2	1	1	13	4	20	42	27	24	3	6	11
Sanitation	84	14	6	0	0	1	2	11	49	27	11	5	1	16
Laboratory	19	63	10	5	16	37	0	16	42	21	26	5	0	5
Health education	6	33	0	0	0	17	0	33	17	17	0	0	0	0
Statistics	6	50	0	0	0	33	0	33	17	0	17	0	0	0
Administration	0													
Other	13	54	0	0	0	38	0	23	46	38	31	15	0	0
State	**302**	**32**	**9**	**4**	**2**	**17**	**1**	**10**	**29**	**11**	**15**	**6**	**1**	**5**
Medical	15	20	13	0	0	0	0	27	7	7	0	0	0	0
Nursing	14	14	0	0	7	0	0	14	14	14	0	0	0	0
Sanitation	47	57	17	26	4	8	0	32	51	26	15	8	4	23
Laboratory	158	30	8	1	2	25	0	2	25	7	13	8	0	0
Health education	7	57	0	0	0	14	14	57	14	0	14	0	0	0
Statistics	21	14	0	0	0	14	5	0	43	14	19	0	0	0
Administration	3	33	0	0	0	0	0	33	33	33	33	33	0	0
Other	37	22	14	0	0	8	0	0	24	5	24	0	0	14
High-echelon														
Local	**153**	**40**	**8**	**1**	**0**	**12**	**8**	**22**	**46**	**31**	**23**	**4**	**1**	**3**
Medical	36	39	11	0	0	14	8	19	47	25	25	11	0	3
Nursing	78	46	10	0	0	10	10	28	49	36	26	1	2	0
Sanitation	15	20	0	7	0	7	7	7	47	27	20	0	0	13
Laboratory	8	25	0	0	0	12	0	12	50	50	0	0	0	0
Health education	3	0	0	0	0	0	0	0	33	0	33	33	0	0
Statistics	0													
Administration	4	50	0	0	0	25	0	25	25	25	25	0	0	0
Other	9	56	11	0	0	33	0	22	33	22	11	0	0	11
State	**161**	**34**	**4**	**6**	**2**	**12**	**7**	**17**	**32**	**27**	**7**	**1**	**3**	**6**
Medical	31	39	10	3	0	6	19	16	36	23	13	0	3	0
Nursing	27	15	0	0	4	4	0	15	22	22	0	0	0	4
Sanitation	27	48	0	33	4	7	7	37	63	63	11	4	11	15
Laboratory	23	39	9	0	4	30	9	4	26	13	13	0	4	0
Health education	5	0	0	0	0	0	0	0	0	40	0	0	0	0
Statistics	10	50	0	0	0	40	10	10	30	20	0	0	0	10
Administration	11	27	9	0	0	9	0	9	9	9	0	0	0	0
Other	27	30	0	0	0	11	0	22	30	18	4	0	0	11

[1] Includes personnel in visiting nurse associations.

Table 6. Percentage of workers desiring to leave public health and of all other workers dissatisfied with specified aspects of their jobs

Cause of dissatisfaction	Workers desiring to leave public health (49)	All other workers (1,049)
Inadequate salary	41	21
Lack of freedom and responsibility	31	5
Lack of recognition and appreciation	29	12
Lack of a feeling of belonging	20	5
Lack of opportunities for advancement	18	8
Too much clerical work	16	18
Inadequate work facilities	10	15
Public health in general	45	14

frequent among staff personnel in State health departments. Relatively few of the staff laboratory personnel in State health departments or of the staff physicians in either State or local jurisdictions found their jobs satisfying in this respect. By contrast, a relatively large number of high-echelon nursing personnel in local agencies and of high-echelon sanitation personnel in State agencies found satisfaction in the freedom and responsibility for decisions and action which their jobs offered.

Four percent complained because so much of the work was indoor, office work. This objection was met with more frequently among high-echelon than staff personnel, and most frequently among high-echelon medical personnel in State health departments. On the other hand, 8 percent enjoyed their jobs because of the outdoor work involved. For all practical purposes, however, this feeling was restricted to staff and high-echelon sanitation personnel in State and local agencies and to staff nurses in local agencies. None of the workers in this study expressed a dislike of outdoor work or satisfaction with indoor work.

Three percent of the workers complained that the working day was too long. Complaints were more frequent among State than local personnel, principally because of the dissatisfaction of members of the sanitation service with this aspect of their jobs. Eighteen percent of the workers expressed satisfaction with the length of the working day. Such positive feelings were least frequent among high-echelon personnel in State health departments.

Less than 2 percent of the workers felt that the work was too arduous. Four percent considered it important to mention that the work was not arduous.

Workers Desiring to Leave Public Health

Forty-nine of the one thousand ninety-eight workers interviewed in this study stated that they would like to leave public health for another career. In table 6 are shown the percentages of these workers and of all other workers who were dissatisfied with various aspects of their jobs. From these data, it can be seen that expressions of dissatisfaction were considerably more frequent among the workers who wished to leave public health. A much larger percentage of these workers than of all other workers were dissatisfied with low salaries, lack of responsibility and freedom of action, the absence of opportunities for advancement, and the lack of recognition and a sense of belonging in the agency, as well as with public health in general.

The relative importance of the various causes of dissatisfaction is shown in another frame of reference in table 7, which records the percentage of all dissatisfied workers in each category who desire to leave public health. These

Table 7. Percentage of dissatisfied workers who desire to leave public health

Cause of dissatisfaction	Total number dissatisfied	Workers desiring to leave public health	
		Number dissatisfied	Percent of total dissatisfied
Inadequate salary	240	20	8.3
Lack of freedom and responsibility	68	15	22.0
Lack of recognition and appreciation	140	14	10.0
Lack of a feeling of belonging	62	10	16.1
Lack of opportunities for advancement	93	9	9.7
Too much clerical work	197	8	4.1
Inadequate work facilities	162	5	3.1
Public health in general	169	22	13.0

data indicate that the feeling of a lack of freedom and responsibility is the most potent factor contributing to the desire to leave public health. Almost 1 in 4 of those who feel this lack in their work want to give up public health work altogether. Lack of a feeling of belonging in the agency would seem to be another potent factor, for 1 in 6 workers who mentioned this lack wish to leave public health. These two areas of dissatisfaction are ones in which remedies may be found through improved administration, without additional funds.

Summary and Conclusions

Fourteen percent of the workers were unhappy about public health work in general. These feelings were not associated with governmental or administrative level or service. Although the general dislike for public health of some of the workers might be related to the character of current public health organization and practice, it would seem safe to say that often it is, rather, a reflection of personal incompatibility to this type of work, and that both public health and the individual concerned would benefit in the long run by the withdrawal of this group from public health.

Specific causes of dissatisfaction mentioned frequently were: inadequate salary, excessive clerical work, inadequate work facilities, lack of recognition and appreciation in the agency, lack of opportunity for advancement, lack of responsibility and freedom of action, and the absence of a feeling of belonging in the agency. They were voiced, in the order given, by 20, 16, 14, 11, 8, 6, and 5 percent of the workers.

Although many of these complaints were shared by all, regardless of governmental level, administrative position, or service, these factors played an important role in a number of instances. Thus, dissatisfaction with salary appeared to be most common among sanitation personnel in local health departments and nurses in supervisory and administrative positions in State health departments. Staff sanitation and laboratory personnel in State health departments tended to be disturbed about the lack of opportunities for advancement and the meager recognition and appreciation which they received. Furthermore, State staff personnel generally, and the laboratory workers particularly, were most apt to feel that they missed a feeling of belonging in the agency.

Dissatisfaction because of lack of responsibility and freedom of action occurred most frequently among staff medical personnel in both State and local health departments and among staff sanitation personnel in State health departments. The burden of clerical work seemed to be felt most heavily by sanitation workers and staff physicians in State health departments and by high-echelon nurses in local agencies. Laboratory and statistics personnel were most prone to complain of inadequate working facilities.

Sixty percent of the workers expressed satisfaction with their work in public health. The greatest single source of satisfaction for public health workers was not in their jobs but in their associates. Twenty-nine percent of the workers chose to emphasize the satisfying nature of relationships with their co-workers. The next most frequent source of satisfaction was the personal gratification which came with a feeling of responsibility and freedom to make decisions and take appropriate action. About one-fourth of the workers said that this characteristic of the work was particularly satisfying to them. Among the next five most frequent sources of satisfaction, each reported by at least 10 percent of the workers, were two which might be classified as meeting emotional needs. These were a feeling of belonging in the organization and recognition and appreciation of the worker's contributions. The other three were concerned with length of the working day, salary, and job security.

Although such economic considerations as salary and security are important determinants of the public health worker's feelings about his job, matters of a more personal nature, such as relationships with co-workers, a feeling of belonging, recognition and appreciation, and the sense of importance which results from having responsibility and exercising authority, are at least equally important. It should be possible, even without additional funds, to improve these aspects of the public health worker's job through proper administrative practices.

Few will care to deny that, as a general rule, burdening professional personnel with clerical

work is evidence of improper administration. Perhaps it is not equally apparent, but it is true nonetheless, that proper administrative practices can be effective in fostering good interpersonal relations on the job. They can also provide for recognition and appreciation of the worker's efforts and accomplishments. A feeling of belonging will grow in any organization that is administered in such fashion that a sense of mission is inculcated not only in the men at the top but in every member of the team. Moreover, the proper delegation of authority and responsibility is essential to day-to-day efficiency and, perhaps even more important, to the morale and health of the organization.

Too often, the health of the organization is overlooked in our preoccupation with the health of the community. This practice will inevitably detract from the success of public health programs.

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A United States pediatrician in Peru demonstrates a public health approach to the personal health services of a mountain village.

A Child Health Program *in the* Mountains of Peru

By CRAIG BURNS, M.D.

THE MOUNTAINS of Peru rise quickly and sharply a few miles inland from the sea. The train from Lima must climb to 3 miles above sea level before it reaches a pass through which it can proceed to the Andean plateau and thence to the town of La Oroya, 137 miles to the east. It is the people of this area, which is in the region of Peru called the *sierra*, with whom this paper is concerned.

The Andean plateau of central Peru is above the tree line. Its elevation varies from 10,000 to 16,000 feet, with most of the people living at altitudes between 11,000 and 15,000 feet. A few eucalyptus trees, brought in after the conquest by Pizarro, grow in some of the sheltered valleys at the lower levels. The climate is temperate, with as much sunshine as in Reno, Nev. In summer, December through March, rainfall is moderately heavy, night temperatures rarely fall below freezing, and the daytime temperature is about the same indoors and out. During winter, June to September, almost no rain falls, the nights are cold and frosty, and the days are warm and sunny. Because the air is thin, it is difficult to start a fire, and water evaporates at an astounding rate.

Dr. Burns is chief physician of Chulec General Hospital, operated by the Cerro de Pasco Corp. at La Oroya, Peru.

The climate of the plateau is invigorating, and there are few insects, no reptiles, and no dangerous beasts. But it is no paradise. Syphilis and tuberculosis are major afflictions. Typhoid fever, typhus fever, rabies, and hydatid disease are endemic. From data obtained in La Oroya, it is estimated 1 of every 4 children dies before the age of 13 years.

It should be emphasized, however, that health conditions throughout Peru are improving at an ever-increasing tempo. The Peruvian Ministry of Public Health, which has responsibility for the health of all the people, is conducting campaigns against prevalent diseases. Municipalities are participating in the national health program in matters concerning sanitation of public buildings, urban hygiene, protection of food and water supplies, and sewage systems. The Servicio Cooperativo Interamerican de Salud Pública, an official Peruvian agency financed jointly by the United States and the Peruvian Governments, is engaged in almost all phases of preventive and curative medicine. Attention given to the problems of the hard-to-reach regions of the *sierra* is quite naturally less than that given to the more accessible coastal areas. As in other mountainous areas of the world, living conditions in the *sierra* do not attract volunteers in health work.

Particularly important in Peru is the advance in industrial hygiene. Since 1947, when a law made mandatory an industrial hygiene

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program for miners and other industrial workers, the Department of Industrial Hygiene, with assistance from the Servicio, has conducted medical and engineering studies in many of Peru's industries. Already evident are improvements in control of dust, in sanitation, and in protective devices for workers.

Another significant factor in health is the effort, by both the government and the large industries, to improve housing. New houses under construction by one large mining company for its workers have two rooms, a stove, running water, and a flush toilet. Many families in the *sierra*, however, still live in one-room houses without inside water or sanitary facilities. In the mining towns, these houses have a stove or fireplace. In the outlying areas, the natives construct a low stone house, called a *chosa*, with a roof of straw or grass through which the smoke from cooking and heating fires seeps out. The floor of the *chosa* is dirt, and the bed is a bank of earth, a few feet above the level of the floor.

In the plateau area, the Peruvian Government operates two general hospitals for workers (but not for their families) and one tuberculosis hospital, and it has set up agencies for public health work. In addition, the Cerro de Pasco Corp., which has mining, smelting, and ranching operations throughout the *sierra*, maintains 10 hospitals and 8 dispensaries, employing 22 physicians. It provides medical care for its workers and their families, some 60,000 people in all.

My assignment in La Oroya began in late 1953. There had been little public health work in this area, and the number of children needing medical services was startling. Chulec General Hospital, a 130-bed, well-equipped hospital of the Cerro de Pasco Corp., cares for most of the town's 25,000 population and also receives patients needing specialized treatment from the other nine smaller company hospitals. The hospital employs 8 physicians and 3 interns, and it operates a separate outpatient clinic staffed by 2 Peruvian physicians. Because the patient load of these facilities was overwhelming, I found it necessary to abandon specific objectives of general practice and to concentrate on the sources of human ills—unhygienic practices, improper diet, and endemic diseases.

The fundamental need was for health education. One of the difficulties, however, was the lack of means of communication. About 95 percent of the population is Spanish speaking; the remainder converse only in Quechua, the old Inca language. Almost half of the population cannot read or write. An incident in March 1954 demonstrated that even colorful and attractive charts containing printed words could not be depended upon to deliver the desired message. We placed three such charts, on nutrition and diet, in the hospital waiting room, which was crowded with patients. Were they well received? Was everything clear to the patients? A quick survey disclosed that not one patient in the room understood the charts.

In attempting health education, one may begin with the adults and hope that the new information will be handed down to the young people. I believe, however, that major emphasis should be given to the health of the children. This is the story of the development of a child health program in La Oroya. It recounts experiences from December 1953 through November 1954, and it shows the progress of ideas, the work accomplished, and the changes in attitudes of all persons concerned.

The Pediatric Department

December 1, 1953: *Pediatric department organized at Chulec General Hospital; children's bed capacity doubled, from 4 to 8! An average of 200 children seen daily in outpatient clinic; no time for immunizations, adequate records, or followup care. Few parents will accept routine immunizations for their children or allow them to be hospitalized.*

Establishment of the pediatric department was the beginning of the concentrated effort to improve the health of the children in La Oroya. In past years, few children had been patients of the hospital, although there was much illness and many deaths among them. According to information obtained from the parents of children brought to the hospital or the clinic during the period of this report, 27 percent of their children had died before they reached the age

of 13 years (which is the age when many of the children begin to shift for themselves), but only 6 percent of these deaths had occurred in a hospital (table 1). It seemed that the people of La Oroya did not have much faith in medical care or that they did not understand that it was not necessary for so many children to die. We soon learned, however, that it was not that they were adverse to hospitals and modern medicine, but that they didn't know what to expect from them. This is illustrated by the following incident:

January 29, 1954: *Parents brought in 3-month-old baby with six toes on left foot. Since local superstition about having six toes creates fear and anxiety, they wanted an operation right away—they would wait while we took off the unsightly toe so that they could take the baby home. Finally, they were persuaded to leave the baby for 4 days. Brother of baby also had six toes and had been successfully operated upon earlier.*

By February, the bed capacity of the pediatric ward had been increased to 14, not counting bassinets for infants. By May there were 20 beds for children, 16 bassinets, and 2 incubators. Of necessity, the ward is run quite differently from such wards in the United States. For lack of space, beds are close together; there is no possibility of isolation. Most of the children eat their meals at a table in the center of the room, where the older children assist the younger ones. All the children are helpful and cheerful. A few newcomers cry for the first 24 hours, but rarely do the children fight among themselves. Many are reluctant to leave the hospital.

Visiting days at the hospital, Wednesdays and Sundays, are a festival. In troop parents and relatives in colorful costumes, the women carrying babies in *mantas* on their backs and all carrying baskets of fruits and jars of jellies. They sit on the floor about the beds, orderly and quiet, but they have many questions to ask. At first, at least half of the visiting parents wanted to take their children home with them, but now we are rarely bothered with these requests.

Causes of Illness and Death

The hospital data presented in tables 2 and 3 give some idea of the causes of death and illness among the children in La Oroya. According to these data, pneumonia, diarrhea, and tuberculosis rank high as causes of both illness and death, and syphilis is a major cause of illness. Burns, often resulting from the use of kerosene

Table 1. Births and deaths of children among families interviewed in Chulec General Hospital and outpatient clinic, December 1953–November 1954

Month of interview	Number of families interviewed	Number of children born	Number of children living	Number of children dead [1]	Percent of children dead	Number of deaths in hospital	Percent of deaths in hospital
1953							
December	91	419	314	105	25	7	7
1954							
January	77	338	242	96	28	5	5
February	99	401	288	113	28	13	11
March	93	377	270	107	28	5	5
April	93	417	315	102	24	9	9
May	82	350	246	104	28	7	7
June	101	391	292	99	25	3	3
July	90	383	281	102	26	7	7
August	101	428	318	110	25	8	7
September	92	396	278	118	29	4	3
October	93	401	278	123	30	3	2
November	88	386	280	106	27	5	5
Total	1, 100	4, 687	3, 402	1, 285	27	75	6

[1] Under 13 years of age.

". . . the women carrying babies in *mantas* on their backs . . . ."

or gasoline to start fires in this area, also are a frequent cause for admission to the hospital.

Routine chest X-rays of adults show scar tissue of healed tubercles in more than 25 percent of those examined. That the disease remains a major problem is shown by the number of patients reporting for treatment as well as by the results of tuberculin tests and X-ray surveys. In one grade school of 800 students, 34 percent had positive reactions to the Mantoux test, and 3.36 percent were found to have active pulmonary tuberculosis.

Response to treatment for tuberculosis is remarkable. Good food, a bed to sleep on, and rest produce amazing results—the antituberculosis drugs are merely a dessert. Almost every patient responds rapidly to treatment. Active pulmonary tuberculosis has been cured even with ambulatory outpatient treatment.

Syphilis is seen in many forms. Several babies with arms and legs as hard as bone have been brought into the hospital. Others have syphilitic deterioration of the nose, the lips, or the anus. X-rays of older crippled children reveal old healed syphilitic involvement of the joints. Blindness and other eye conditions resulting from this disease are not uncommon.

Hydatid disease was diagnosed in 1.4 percent of the 437 children admitted to the hospital. In this region of Peru, there are some 200,000 sheep, one of the natural hosts of the *Echinococcus granulosa*, and a great number of dogs, one of the carriers between animals and man. We found the disease as common among town children as among those living on the sheep ranches. Usually, the cysts are in the lungs, but we have found 1 in the axilla, 2 in the liver, 2 in the abdominal cavity, and 1 in the neck. The Casoni skin test is always positive in the presence of these infestations. Not one child has died from surgical removal of the cyst or cysts.

Each month there are a few patients with typhoid fever in the hospital, although there is never an epidemic. The Cerro de Pasco Corp. filters and chlorinates its water supplies, but there is no chemical or sanitary protection for the people living outside the larger towns. The rural women wash clothes in the same streams that carry sewage, and during a few months of the year, there are many flies.

Native Customs and Health

June 28, 1954: *Conference today with 50 union leaders representing the workers in the mines and smelters of the Cerro de Pasco Corp. They believed that climate, lack of money to spend on imported foods, and insufficient medical services were the three main causes of infant and child mortality. Demonstrations and discussion seemed to convince them that these were not the real causes.*

The appeal to these 50 slightly antagonistic fathers with union responsibilities began with the presentation of two charts. One compared the low death rates of infants and children in the United States with the very high rates in the La Oroya area. The second showed the estimated average number of days a year a child in the United States is ill and the comparable figure for their children. Especially emphasized was the negative influence of illness on the growth of children. When asked to give what

Table 2. Major causes for admission of children to the Chulec General Hospital, December 1953–November 1954

Cause for admission [1]	Number admitted	Percent of total [2]
Pneumonia	70	16.0
Diarrhea	65	15.0
Syphilis	36	8.2
Tuberculosis	22	5.0
Burns	22	5.0
Kidney	17	3.9
Typhoid fever	15	3.4
Cardiac	8	1.9
Other, including parasites and surgery	182	41.6

[1] Only one diagnosis (reason for admission) considered here.
[2] A total of 437 children admitted during period.

they thought were the reasons for the differences shown in the charts, the union leaders expressed the opinions previously mentioned.

If these were the true reasons, we stated, then the children of all ages should be affected about the same. But this was not so. A chart (fig. 1) showed them that a large percentage of the deaths among children occurred before the age of 2 years. Here was a problem—what causes so many children to die during the first 2 years of life? We believe that the lack of iron-containing foods in the diet of young children—a majority of the children are anemic before they reach the age of 2 years (fig. 2)—and the use of *fajas* are contributing significantly to this situation. We proceeded to try to convince the union leaders of the importance of these factors.

The men laughed when shown a picture of themselves at night—a man and a woman lying on a bed with a child between them breast-feeding throughout the night. We explained that allowing the child to breast-feed all night (a practice that may continue until the child is 2 to 4 years old) spoils his appetite for health-giving foods in the daytime. A child needs iron, and there is practically no iron in milk. To illustrate the last point, we used the following demonstration:

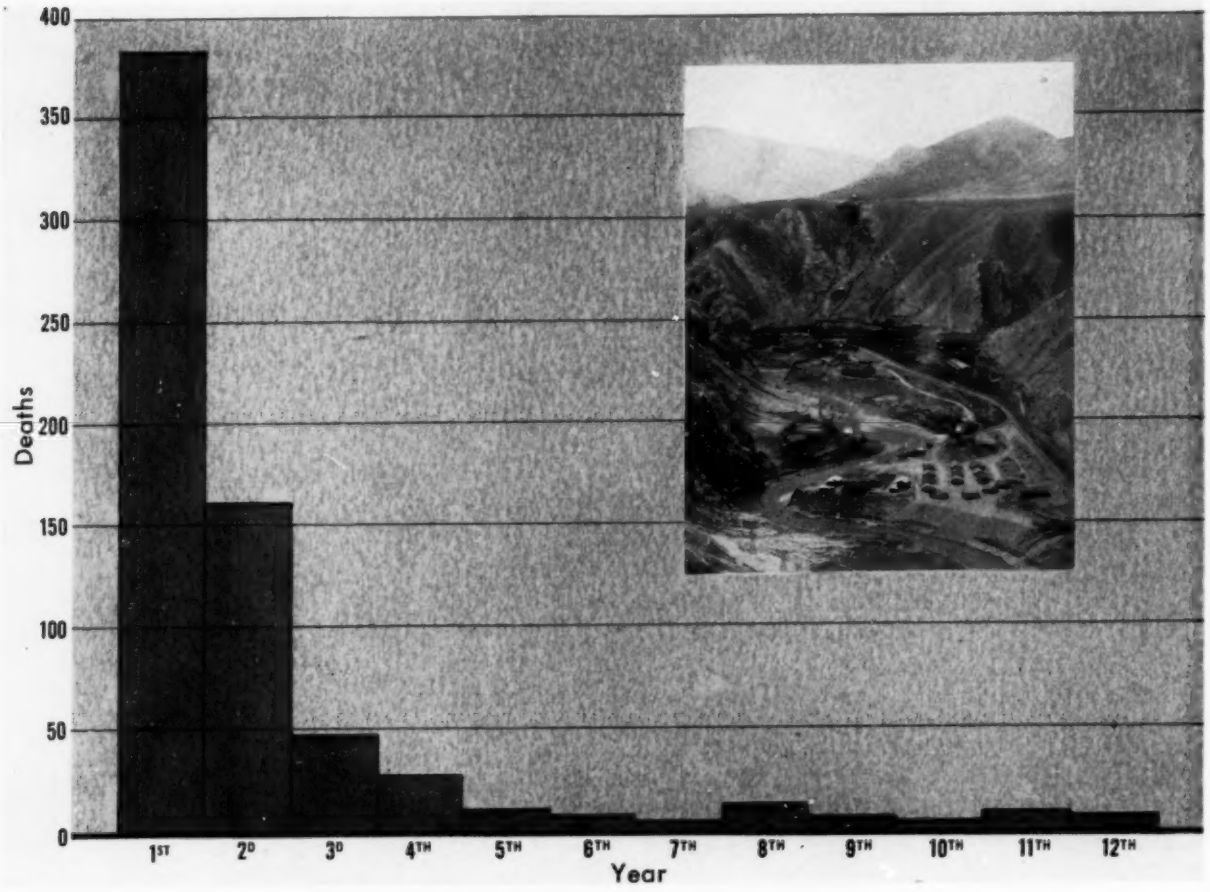
Two 2-liter beakers were placed on the table, along with a 1½-liter bottle of basic fuchsin solution (which is the color of blood), and a quart bottle of milk. The first beaker was filled one-third full of fuchsin solution, to represent the amount of blood in a newborn baby. The second beaker was filled almost full with the fuchsin solution, to represent the amount of blood in a 1-year-old child. During the first year of life, the baby's body has to make the quantity of blood shown by the difference in the amount of liquid in the two beakers. If the baby gets only milk (containing no iron), the blood looks like this—and the quart of milk was emptied into the first beaker, bringing the level of the liquid up to the level in the second beaker. What a difference in color! The blood fortified with milk was a sickly pink shade.

By now the men began to appear interested. Appetite for iron-containing foods, as well as other nutritional foods, we continued, is also

Table 3. Causes of death among children under 13 years of age in Chulec General Hospital, December 1953–November 1954

Age	Cause of death					
	Pneumonia	Diarrhea	Tuberculous meningitis	Tuberculosis	Other causes	Unknown
0–6 months	3	0	1	1	2	0
6–12 months	1	4	1	0	0	0
1 year	3	3	0	1	2	1
2 years	1	0	1	0	0	0
3 years	1	0	1	1	0	0
4 years	0	0	0	0	1	0
6 years	0	0	0	0	0	0
11 years	0	0	1	0	1	0
Total	9	7	5	3	6	1

Figure 1. Age at death for 675 children of the Peruvian sierra, according to information obtained from their parents.



dulled as a result of the practice of adding sugar to all liquid given a child—1 to 3 teaspoonfuls to every cup of water or milk or coffee. Sugar does not contain iron, and we demonstrated this point as follows:

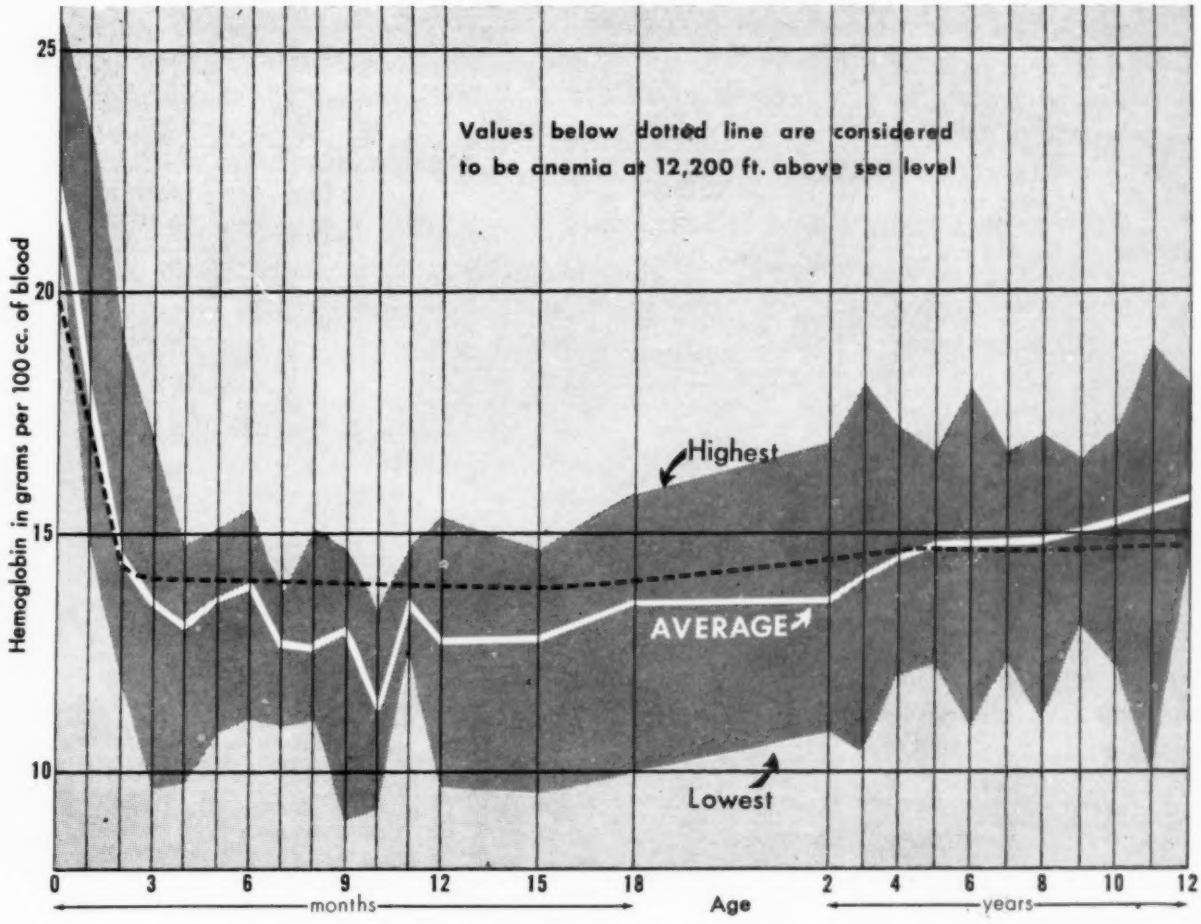
Sugar, like wood, burns and gives energy, with only ashes left—no minerals, no iron to form blood. Had they ever obtained iron by burning wood? A stick of wood was produced and burned—the men smiled when the ashes were passed around for their inspection. Did they know that sugar would burn too? A volunteer was called for, a man smoking a cigarette. A pile of sugar was placed on a plate on the table. Cigarette ashes were mixed with the sugar, the ashes representing the chemicals in the body. Then the sugar was ignited with a match, and the men saw that it burned like wood. They could find no iron in the ashes.

After these demonstrations, we emphasized that there were plenty of iron-containing foods available locally, but that they were not being used. We urged the men to send their wives to the clinic so that we could instruct them in proper diet for children.

Next, the subject of *fajas* was discussed. *Faja* is the name of the woven cotton or wool band which is wrapped around a baby from the time he is born until he is 2 or 3 years old. Three *fajas* are usually used. One is placed next to the skin around the chest. The second is wrapped around the body and arms at the level of the elbows to keep the baby from using his arms to climb out of the *manta* in which he is carried on his mother's back. The third *faja* is placed at the level of the knees to keep the baby's legs quiet.

When asked about the *fajas*, every woman gives the same answer: If the baby does not begin life with the *fajas*, *se recalca*. But get-

Figure 2. Hemoglobin values for 365 children tested in La Oroya, December 1953–November 1954.



ting to the meaning of *se recalca* is another matter. It means that the ribs will not stay where they should. It means that the baby will have stomach pains. It means that the baby will have "much cough" when he grows up and that he must then be held upside down and shaken so that the bones will go to the proper places. But the *fajas*, we attempted to explain, prevent full expansion of the lungs and hinder blood circulation and normal body movements in the rapidly growing baby, and thus they may contribute to many of the ills and deformities of the population. We have seen deformed ribs and concave thoraxes produced by this constriction.

Child Health Clinics

May 31, 1954: *The first child health clinic was held in La Oroya today, from 3 to 4 p. m. Number of patients was overwhelming. Managed to see 14 mothers with 18 children. Gave 17 injections of DTP vaccine; instructed the mothers on diet and cleanliness; and distributed fifteen 1-cc. dropper bottles of ferrous sulfate solution.*

The need for a children's clinic in La Oroya had been recognized early, and plans for the operation were under way by April. The clinic was envisaged as a means not only of providing medical care but of increasing the efforts to prevent illness. Hence, immunizations against such diseases as whooping cough, diphtheria, smallpox, and typhoid fever, as well as education in matters of diet, cleanliness, and the like, have been as important a part of the clinic program as the treatment of ill children.

At the conference with the union leaders previously mentioned, the final subject of discussion

was immunizations. A show of hands revealed that 13 of the men present were unable to sleep well the night before because of coughing children. We guaranteed them that if they saw to it that their workers brought their children to the clinic for whooping cough immunizations, there would be no epidemic of that disease the next year.

Originally scheduled for 2 hours a week, the clinic was soon being held 10 hours a week. Always, there were more patients than could be seen in the allotted time. By August, although most of the mothers still brought their children because of cough, fever, or diarrhea, a few were coming only to receive the immunizations.

School Health Program

August 26, 1954: *Our first visit to a school—76 students aged 4 through 12 years. Set up table and chairs in the playground and administered smallpox and DTP vaccine to each child. Placed inkmark on child's right hand to show that he had received the immunizations—his badge of bravery.*

This visit represented another major step in the child health program, for it was the beginning of our school health activities. Two more visits were made to this school to complete the DTP immunizations, and during these visits many of the children's mothers appeared in the schoolyard and asked us to vaccinate their children who were too young to attend school. One mother even brought a small dog, figuring that what was good enough for her baby was good enough for her puppy.

On September 8, 1954, we held our first conference on health with the teachers of one of the larger schools in the town (800 students). The teachers unanimously agreed that nutrition was the major health problem, and we discussed a powdered-milk program as a first step in meeting it. (The powdered-milk program finally got under way in mid-1955.) We also presented a filmstrip lecture on how disease is transmitted, and the following week we gave the same lecture to each class as an introduction to a typhoid immunization program. Subsequently, the typhoid immunization program was carried out, with full cooperation from both students and teachers. Interest ran particularly high because one schoolboy, the son of one of the teachers, became ill with typhoid fever 2 days before the program was begun.

In November, BCG immunizations were begun. The vaccine is made in Lima and furnished free by the Peruvian Government, which also supplies free the typhoid, DTP (from UNICEF), and smallpox vaccines. Every baby born in the hospital and every schoolchild who reacts negatively to the tuberculin skin test now receive the BCG vaccine.

Recent Developments

A review of the child health clinics after the first 6 months of operation indicated that we were not making the best possible use of our time. The following changes have been made in recent months:

1. A Peruvian physician specializing in pediatrics sees all children brought into the outpatient clinic in La Oroya. He has a staff of three auxiliary nurses trained in pediatrics (Peruvian women who have received training at Chulec General Hospital), who interview each mother and give her instructions as to diet, cleanliness, and when to return to the clinic.
2. Every child brought to the outpatient clinic is given DTP and typhoid immunizations.
3. A child health nurse has been employed to supervise the child health program in the clinics, the schools, and the outlying areas.
4. A visual education program has been started in each of the schools to teach the importance of cleanliness and immunizations.
5. A well-baby clinic has been established.
6. Every mother delivering a baby at Chulec General Hospital is given a course of instruction in infant care while she is in the hospital.

Summary and Conclusions

In line with the increasing efforts to improve health conditions throughout Peru, an intensive child health program was begun in La Oroya in December 1953. The first action was

the establishment of a pediatric department at the Chulec General Hospital. Within the next year, child health clinics were started and a school health program was initiated. These latter activities, with their emphasis on immunizations and health education, were directed toward the prevention of illness, rather than its treatment.

The tempo of progress in the betterment of health in Peru has been accelerating rapidly during the past 5 years. This can be attributed largely to the following factors:

1. Efforts of the Peruvian Government and assistance from the bilateral programs of the United States and from international health agencies.

2. Change for the better in the attitude of foreign companies toward their workers.

3. The antibiotics. (It would be almost impossible to attempt a program against syphilis without penicillin, for example.)

4. The provision of better housing by both the Government and the foreign corporations.

My work in La Oroya for the past 2 years leads me to the conclusion that the following items are among those most needed for further advancement:

1. Better equipped schools and more years of instruction—to raise the level of general education, as well as health education, and to make it possible for more Peruvians to meet the requirements for advanced education so that the supply of trained local people can be increased.

2. A 300-bed tuberculosis hospital to serve the people of the central Andean plateau.

3. Improvement of the public roads.

4. Incorporation of a utilizable form of iron in canned milk to help combat anemia.

Vending Stands for the Blind

A report from the Office of Vocational Rehabilitation issued at the end of October 1955 showed that 1,721 blind vending stand operators (602 on Federal property) were employed in 1954 as against 1,659 during 1953, the previous high. Operators and their employees (310 blind and 746 sighted assistants) earned $5.3 million in the year ending June 30, 1955, an increase of $500,000 over the preceding year. The net earnings of the operators totaled approximately $4 million and those of the assistants, $1.3 million.

An act initially passed in 1936 provided for the establishment of vending stands in federally owned or leased buildings. Amendments in 1954 authorized the establishment of such stands on other property, such as national parks and grounds of Federal buildings. They require each Federal agency in control of property to issue regulations designed to assure preference for blind persons in the operation of vending stands on that property.

The great majority of the blind persons employed in the vending stand program have been trained through the State-Federal vocational rehabilitation program. Only about 8 percent of the estimated 320,000 blind persons in the United States are employed although experience has indicated that about 25 percent of those disabled by blindness can be trained for gainful employment.

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Classifying the Tuberculous for Isolation in California Mental Institutions

By WALDO R. OECHSLI, M.D., EDWARD KUPKA, M.D., M.P.H., and CHESLEY BUSH, M.D.

TUBERCULOSIS is a well-known scourge among the mentally ill. When a patient with active tuberculosis is admitted to a mental hospital, because of the nature of his mental illness, he may cough or expectorate only infrequently or not at all. He may be afebrile. He is not X-rayed and not diagnosed and thus becomes a focus of infection in the large confined population. Overcrowding in the past has sometimes been so severe that a patient often had to climb over another patient's bed to reach his own.

Such circumstances are ideal for transmittal of the disease; in time, the secondary cases infect others, and the vicious circle continues. This situation is due to a number of factors: lack of knowledge of who are the actively tuberculous individuals being admitted to a greatly overcrowded hospital population; the absence of an easy, practical method of discovering tuberculosis; incomplete segregation; absence of treatment for unrecognized cases; and the tendency of tuberculosis to become reactivated (*1*). The key underlying factor in the problem is the communicability of the disease.

Procedures for Control

Periodic X-ray surveys of the entire hospital population, including personnel, segregation of the tuberculous thus discovered, and instituting an X-ray program at admission have become the basis for the solution of this, one of the most serious remaining problems in the tuberculosis control field. In many States there is increasing evidence that this approach is successful in reducing the number of new cases discovered by annual X-ray surveys and in decreasing the intramural tuberculosis death rate.

A death rate of over 1,000 per 100,000 population among hospitalized mentally ill was not uncommon 20 years ago as compared with a rate of 56.6 per 100,000 among the general population in the United States in 1934. As more diagnosis, segregation, and treatment are effected, the rate in mental institutions is dropping. In 1948, Anderson (*2*) reported that the tuberculosis death rate for 682,251 patients in the mental institutions of this country was 535 per 100,000. Weber (*3*), in Toronto, reported a drop in the intramural death rate from 414 in 1938 to 182 in 1952. Katz and his coworkers (*4, 5*) in New York reported a decrease in death rate from 623.6 per 100,000 in 1935 to 252.4 in 1951, and they attributed this decrease to environmental factors, chiefly early diagnosis and segregation.

In the California hospitals for the mentally ill, the death rate rose substantially until 1946, to a peak of 800 per 100,000 resident population (table 1, fig. 1). Since 1946, when a continuing X-ray survey and segregation program started, the death rate among the mentally ill has dropped 65 percent—to 283 per 100,000. Among the mentally deficient, the death rate, which had generally been lower than among the mentally ill, has dropped to 29 per 100,000.

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Tuberculosis Classification for Isolation

Type A. Active and probably active; communicable.

Type B. Probably inactive; greater than minimal extent; potentially communicable; more likely to undergo reactivation than type C.

Type C. Strictly minimal in extent; inactive; presumably not communicable; reactivation considered unlikely.

Type D. Calcified primary lesions, parenchymal or hilar or both. Considered essentially negative.

Type E. Formerly suspected tuberculosis, now negative on film; probable nontuberculous pathology; calcified or thickened pleura only.

This favorable result is due largely to the aggressive case-finding and isolation program in effect.

Satisfactory as this decline may appear, much remains to be accomplished. Continuing persistent effort will be necessary. Instituting an X-ray program at admission and surveying a mental hospital once are not sufficient. Wherever repeated annual X-ray surveys have been carried out, it has been found that a certain number of new cases develop within the institution each year even among the apparently unexposed. In California, the first survey (*6*) revealed a prevalence of a tremendous number of unsuspected cases of tuberculosis. Later an annual survey incidence rate of about 1½ new active cases per 1,000 patients X-rayed was found (*7*). The true incidence rate is unquestionably higher than the survey incidence rate.

Deficiencies in Control

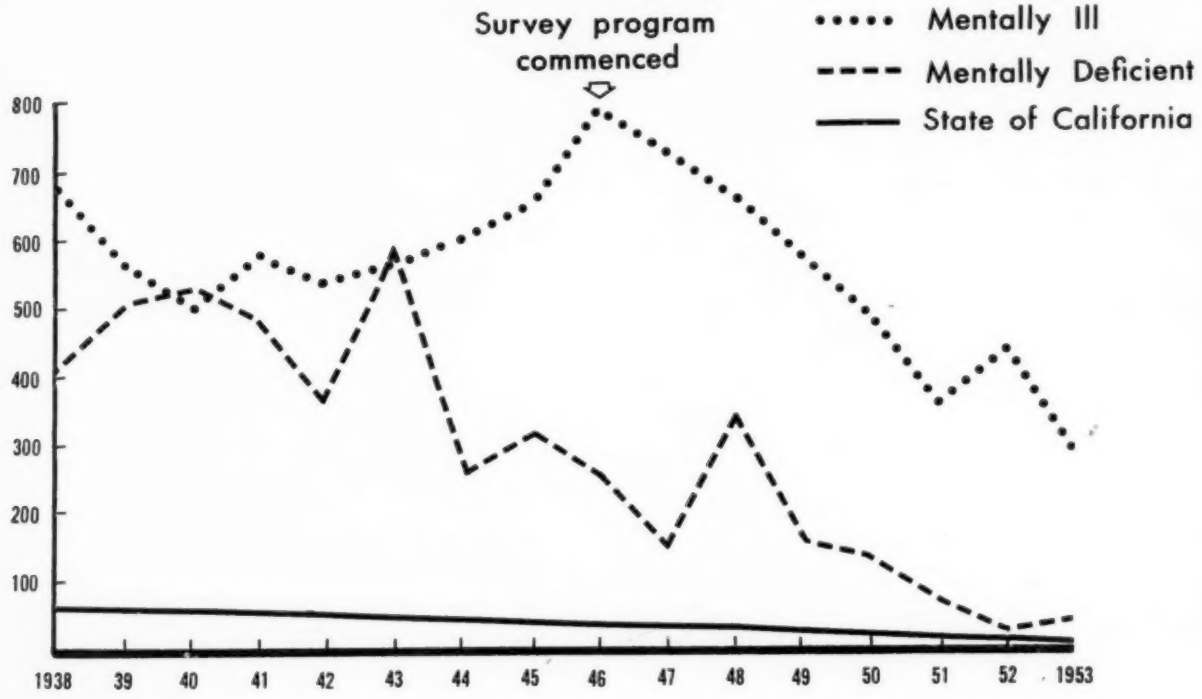
Granting the theoretical possibility of endogenous reinfection as a factor, in our opinion these new cases arise chiefly because of deficiencies in the control system. These deficiencies may be many, depending on the stress laid on the tuberculosis control program and the zeal with which control measures are applied. They include failure to take admission films on all patients; failure to include patients on parole; and the very ill, infirm, or disturbed patients in annual X-ray surveys; delay in discovering reactivation of tuberculosis through failure to X-ray periodically those with supposedly inactive disease; missing the diagnosis of active tuberculosis which is occasionally atypical in its manifestation; and too great dependence on demonstration of tubercle bacilli as a criterion for segregation.

Probably most important among these deficiencies is the occurrence of reactivation of

Table 1. Tuberculosis death rates per 100,000 in California mental institutions and in the State, 1938–53

Year	Mentally ill			Mentally deficient			State death rate
	Average daily population	Number of tuberculosis deaths	Death rate	Average daily population	Number of tuberculosis deaths	Death rate	
1938	21, 281	144	677	3, 723	15	403	60. 5
1939	22, 200	125	563	3, 840	20	521	57. 6
1940	22, 853	115	502	3, 950	21	532	56. 3
1941	23, 055	133	576	4, 279	21	491	51. 9
1942	23, 541	128	545	4, 547	17	363	50. 6
1943	23,.961	136	568	4, 738	28	591	45. 7
1944	24, 573	148	607	4, 782	13	272	43. 7
1945	25, 385	169	667	4, 951	16	323	43. 1
1946	26, 101	209	800	5, 078	13	256	41. 6
1947	26, 796	199	743	5, 326	8	152	34. 4
1948	28, 420	190	668	5, 741	19	331	31. 6
1949	29, 675	172	580	6, 205	10	161	26. 3
1950	30, 861	149	482	6, 467	9	139	21. 7
1951	33, 288	122	366	6, 541	4	70	19. 5
1952	32. 808	147	448	6, 600	1	15	15. 5
1953	34, 588	98	283	6, 828	2	29	11. 4

Tuberculosis death rate per 100,000 for mentally ill and mentally deficient in California institutions and for the State, 1938–53



disease in the unsegregated, supposedly inactive tuberculous patients (*8*, *9*). Despite the estimate that the tuberculosis in these patients had been considered as inactive, routine X-rays on 14″ x 17″ films made at the time of annual X-ray surveys showed that unsuspected reactivation had taken place in a certain proportion of such patients. Reactivation was judged by one or more of the following criteria: (*a*) cavitation where none had existed; (*b*) infiltration in a new area; or (*c*) definite increase in density of certain areas of infiltration. Since laboratory aids were often unavailable, it was necessary to make careful comparison of chest X-rays of comparable technical quality before this conclusion was felt to be justified, recognizing that the securing of comparable films on mentally ill persons requires care and patience.

Laboratory confirmation of activity is, of course, more dependable and a more definitive proof of pathological activity. However, such proof was not always available, and conditions had to be dealt with as they were.

It has been said that dealing with the mentally ill, in diagnosis at least, has some of the characteristics of pediatric or veterinary medicine. Often, the patient will not be able to give reliable information regarding his symptoms or cooperate in producing sputum. Add to this the shortage of personnel, especially laboratory technicians, and it becomes necessary to depend heavily upon X-ray findings, even when only a single chest film is available. However, when one has a series of chest X-rays of comparable technical quality, activity of the disease process can often be inferred by changes inter-

Table 2. Reactivation or progression of known tuberculosis among unsegregated mentally ill patients as observed by annual X-ray surveys in California mental institutions, 1947–54

Survey year	Number of patients X-rayed (14″ x 17″ films)	Tuberculosis reactivation or progression	
		Number	Percent
1947–48	261	32	12.3
1948–49	221	19	8.6
1949–50	370	24	6.9
1950–51	410	35	8.5
1951–52	516	26	5.0
1952–53	608	27	4.4
1953–54	597	33	5.5

preted as evidence of progression of disease, as noted above.

As part of the second of the California surveys in 1947–48, 261 unsegregated patients with presumably inactive tuberculosis were X-rayed (table 2). Of these, 32 (12.3 percent) presented X-ray evidence of progression of disease. In subsequent surveys, the percentage of those showing progression dropped to less than half of this ratio. Nevertheless, a ratio of 1 in 20 unsegregated, apparently safe, tuberculosis patients suffering reactivation each year is surprisingly large, dangerous to nontuberculous patients and personnel, and calls for corrective action.

Resolving the Problem

The most nearly complete solution of the problem would seem to be the segregation of all patients diagnosed as tuberculous, regardless of extent of disease or its activity status. This alternative is open to objections. It is too restrictive for the patients who have had arrestment of their disease for many years, and neither isolation space nor additional personnel are available. Other than a laissez-faire policy, the alternative was to appraise the criteria for segregation.

Two solutions presented themselves. Since the crucial factor in communicability of tuberculosis is the presence of tubercle bacilli, it appears logical to base a decision for segregation on the demonstrated presence of the organism in the sputum or in gastric or tracheal washings. Laboratory investigation certainly should be made regularly and frequently. However, it appeared unwise always to await bacteriological proof before segregating a patient with tuberculosis, since a given patient's findings might be negative today and positive tomorrow. Since examination by culture and guinea pigs takes weeks, the hazard of exposure exists for that period of time. Furthermore, laboratory technicians and other needed personnel were not available, and it often was not possible to carry out even a minimum laboratory investigation. Also, it was difficult, and at times impossible, to intubate some of the patients, and dependence on such clinical findings and symptoms as fever, loss of weight, and cough is notoriously unreliable. In some cases tuberculin testing ruled out tuberculosis; however, the small percentage of the mentally ill who are negative to tuberculin minimizes the value of this test.

For these reasons, the other possible solution was utilized—serial chest X-ray examinations. As a starting point we again examined the X-rays of every mental institution patient who had ever had a diagnosis of tuberculosis or suspected tuberculosis. Some patients had only one film, most patients had several, and quite a few of long residence had dozens of films each. The serial films were supplemented by any available sputum studies, skin tests, or clinical evidence. On the basis of this film reappraisal, an arbitrary decision was reached in each instance. If the patient was still considered tuberculous, a further decision on segregation had to be made.

Some type of classification was needed to designate those who should or need not be segregated. The requirements were to categorize patients not by extent or activity of disease alone but by actual or potential communicability. The classification of the National Tuberculosis Association was not suitable for this study for two reasons: "Arrested" under certain circumstances permits a positive sputum by the more delicate tests, and "inactive" includes cases which still have a potential of reactivation high enough to be of great importance in mental hospital populations. Hence, a new classification was created to designate three groups—currently communicable, potentially communicable, and probably not communicable (types A, B, C).

Type A. The finding of tubercle bacilli by any method automatically places a patient in this category regardless of the X-ray appearance. In the absence of positive sputum findings, the chest X-rays must present the findings characteristic of recent, active tuberculosis: soft, exudative, caseous pneumonic or soft, miliary infiltration, or cavitation. Reactivation or extension of infiltration or the appearance of cavity in a recent film also calls for a type A classification. All these patients are presumed to have communicable disease and are strictly segregated. They also are as vigorously treated as their cooperation permits.

Type B. Chest X-rays of patients in this

group give an impression of relative or definite inactivity. Cavity must not be present or suspected. Bullous blebs, of course, must be differentiated. The sputum must be negative by any type of investigation; if it has been positive in the past, it must have been negative for at least 1 year. The infiltration is more or less discrete and fibrotic and may be calcific. There may be sharply circumscribed, dense areas usually associated with encapsulated, caseous lesions. If the disease has been active in the fairly recent past or if of longer standing it is more extensive than minimal, these patients are presumed to present a potential communicability hazard. Segregation, however, need not be quite as strict as for type A patients. They may leave the ward, if attended and supervised, for treatments, motion pictures, beauty parlor, or barber shop. Nevertheless, they should be X-rayed every 3 months and, if possible, sputum examinations or gastric lavage performed periodically every 3 months. Their diet should be adequate. They receive whatever psychiatric treatment is indicated, but they need no treatment for tuberculosis.

Type C. This group includes only those in whom reactivation of tuberculosis is considered quite unlikely. The infiltration must be stable, very discrete and fibrotic or fibrocalcific and of small extent, with no evidence of activity for several years. A sharply circumscribed tuberculoma less than 2 cm. in diameter may be present, if not of recent origin. The laboratory findings, of course, must be negative. These patients are not segregated, but care is taken that they are not lost to observation and they are X-rayed every 6 months. Their psychotherapeutic needs are cared for in the same way as the hospital population generally. If they are to be allowed to work, medical permission is required.

Type D. Calcified primary lesions, which are often hard to differentiate from fibrocalcific minimal reinfection tuberculosis, are placed in this category. Although some of these patients had in the past been included in the tuberculosis register in some hospitals, they are considered here as essentially negative and removed from the register. During the annual X-ray surveys, they are filmed along with the rest of the presumably negative patient population.

Type E. Various miscellaneous patients who sometime in the past were put on the tuberculosis register, but who in all probability were not tuberculous, were also reviewed and placed in this category. They included:

1. Those in whom tuberculosis had been tentatively diagnosed, or in whom infiltration of the lung fields had been observed, but in whom current chest films show completely clear lung fields.
2. Those with infiltration of the lungs once tentatively believed tuberculous. By location or progress, the infiltration seems more characteristic of some nontuberculous condition, particularly suppuration of the lung or bronchiectasis, or coccidioidomycosis.
3. Those with infiltration of the lungs which do not seem typical of tuberculosis, though this cause has not been absolutely ruled out. Great caution should be used in evaluating this group.
4. Those with thickening or calcification of the pleura of undetermined origin, in whom no parenchymal lesions are demonstrable.

Those in categories E-1 and E-4 require no further attention other than inclusion in annual X-ray surveys. Those in categories E-2 and E-3 require continuing clinical and laboratory study until a diagnosis is reached.

Using the Classification Scheme

In the course of this review, we studied over 3,000 sets of chest X-ray films in 11 California State mental institutions in collaboration with the staff physicians in the hospitals. Each case was reviewed; the chest X-rays were carefully studied; and clinical data and available laboratory data were weighed. Decision as to classification rested largely on the serial X-ray films, however, because of the sparseness of clinical and laboratory data.

In 2,915 (85 percent of the 3,443 cases studied) the original diagnosis of tuberculosis seemed valid (table 3). Of the 2,915, 32 percent, or 923, were classified as type A. These constituted the most important group of patients needing strict segregation and active treatment. An additional 832, 28 percent, were classified as type B. This group of patients is considered almost as important as the type A patients. Be-

Table 3. Classification and disposition of mentally ill and mentally deficient patients with known or suspected tuberculosis in California institutions, 1953

Category	Type A		Type B		Type C		Type D		Type E		Total	
	Number	Percent	Number	Percent	Number	Percent	Number	Percent	Number	Percent	Number	Percent
Mentally ill	841	28	777	25	1,024	33	87	3	351	11	3,080	100
Male	572	30	446	23	638	33	54	3	220	11	1,930	62
Female	269	23	331	29	386	34	33	3	131	11	1,150	38
Mentally deficient	82	23	55	15	136	37	23	6	67	19	363	100
Male	41	21	29	15	78	40	11	6	34	18	193	53
Female	41	25	26	15	58	34	12	7	33	19	170	47
Grand total	923	27	832	24	1,160	34	110	3	418	12	3,443	100
Total diagnosed as tuberculous	923	32	832	28	1,160	40	------	------	------	------	2,915	100
Total recommended for segregation	923	53	832	47	------	------	------	------	------	------	1,755	100
Total tuberculous but not segregated	------	------	------	------	1,160	100	------	------	------	------	1,160	100
Total removed from register	------	------	------	------	------	------	110	21	418	79	528	100

cause they have fewer symptoms, negative sputum, and an unchanging X-ray appearance, there is a strong tendency to consider these patients as inactive and, therefore, innocuous. The danger lies in the fact that reactivation (table 2), often unnoticed in the mentally ill, occurs distressingly often in this group of patients. If reactivation does take place, it is usually not discovered until the patient is X-rayed again. If he is not segregated during this period, many nontuberculous patients are exposed to infection. It is important, therefore, that the patients classified as type B should be segregated. Psychiatric treatment is given, of course, as needed.

The remaining 1,160, 40 percent, were classified as type C. This group was restricted, by definition, to those whose tuberculosis appeared very unlikely to reactivate because of its slight extent and fibriotic-appearing character over a long period of time. These patients were not segregated. However, since the estimate of the stability of disease could be in error, these patients should be X-rayed every 6 months instead of annually. Laboratory check is not needed unless the character of the disease changes.

Three percent, 110, of the 3,443 patients studied had findings which were judged as probably due to calcified primary lesions, hilar or parenchymal, or both (type D). Little or no skin testing was done on these patients. The lesions may have been due to coccidioidomycosis or histoplasmosis. These patients were considered as essentially negative and were, therefore, removed from the register.

Twelve percent, 418, of the 3,443 were placed in one or another of the categories under type E. Some of these cases still presented diagnostic problems; others could be considered as nontuberculous.

During and after this review of all tuberculosis patients in the mental institutions, the centralization of tuberculosis patients into a few institutions went on as rapidly as possible. A 500-bed tuberculosis hospital was completed at Patton State Hospital to care for tuberculosis patients from the southern part of California. At Napa State Hospital, a tuberculosis unit houses 240 patients. A 460-bed addition is being constructed there for tuberculosis patients from the central and northern part of the State. Until this addition is completed, tuberculous patients are being cared for at DeWitt State Hospital also. The tuberculous mentally deficient patients have been centralized at Sonoma State Hospital where a 120-bed tuberculosis hospital was built 3 years ago. The numbers of mental patients from which these tuberculous are drawn, in the above regional and type categories, were: mentally ill patients, southern California—13,000; mentally ill pa-

tients, central and northern California—22,000; mentally deficient patients, 7,400.

All patients classified as type A or type B were segregated and transferred to these tuberculosis centers. Type C or type D patients were not segregated nor moved from their wards or institutions. Patients classified as type E were studied further if a diagnostic problem existed. Otherwise, they remained in the general mental hospital population.

Summary and Conclusions

Tuberculosis is still a serious problem of frequent occurrence among the mentally ill and mentally deficient. A program of X-ray of all admissions and periodic X-ray surveys plus segregation are the first requirements in control. However, segregation of patients with active tuberculosis does not entirely meet the problem. Tuberculosis often undergoes reactivation, and, in the mentally ill patient, this fact often goes unnoticed until revealed by X-ray. Segregation of all patients diagnosed as tuberculous, regardless of extent or status of disease, appears impracticable.

The classification of the National Tuberculosis Association is not suited to the needs of mental hospital populations. A new classification has been created, based on the appearance of X-rays plus available laboratory or clinical data. This classification designates three groups, currently communicable (type A), potentially communicable (type B), and unlikely to reactivate (type C). Two additional groups were designated: those with only calcified "primary" lesions (type D) and those once designated as suspects with probable nontuberculous pulmonary disease (type E).

In a review of the case histories and films of 3,443 mentally ill and mentally deficient patients with tuberculosis or suspected tuberculosis in California mental institutions, 27 percent were considered as communicable and were classed as type A; these patients were segregated and treated. Another 25 percent of the patients were considered as potentially communicable and were classed as type B; these patients were segregated but not treated. Thirty-three percent were considered as noncommunicable and not likely to suffer reactivation and were classed as type C; these patients were neither segregated nor treated. A few patients (3 percent) were diagnosed as having only calcified "primary" lesions, and were considered, in effect, as nontuberculous and were classed as type D; these patients were removed from the tuberculosis register and were handled as other nontuberculous mentally ill patients. Eleven percent of the patients reviewed had X-ray evidence of pulmonary pathology which was considered as probably nontuberculous; these were classed as type E and only a few undiagnosed problem cases in this group are still being segregated.

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How One Health Department Helps the Handicapped

By MURRAY GRANT, M.D., D.P.H.

FOR several years, the Cattaraugus County Health Department has participated in the New York State medical rehabilitation program, which arranges for the diagnosis and treatment of physically handicapped children under the age of 21 and of persons of any age with poliomyelitis.

However, participation was not without its obstacles. Chief of these was the local lack of recognized specialists in rehabilitation. As a result, almost all patients eligible for rehabilitation service had to be transported from Cattaraugus County to Buffalo, approximately 70 miles away. Moreover, the expense was imposing an additional tax burden on the people of Cattaraugus County, a rural county of 80,000 with a median income below the median for the United States, where the tax burden was already increasing every year.

During 1953, a survey by the author found that a considerable proportion of the total expenditures for rehabilitation went for treatment of cerebral palsy and poliomyelitis cases and that most of these funds were expended for physical, occupational, and speech therapy. Most patients remained in Buffalo or at a treatment center near New York City for months. During their absence from home, particularly in the case of cerebral palsy patients, the initial zeal with which parents accepted treatment for their children was often transformed into lack of interest and even fear of the burden to be reassumed when the children returned home.

The staff of the county health department felt that, if there were a sufficient number of patients in the county to warrant it, an outpatient clinic staffed by full-time, physical, occupational, and speech therapists and operated by the health department might offer certain advantages:

1. The health department could initiate a rehabilitation program for both children and adults. Many children are not seen under the State rehabilitation program, and therapy is not available to all adults.

2. Patients could be seen 2 or 3 times a week and could continue to live at home instead of being separated from their families for weeks and months.

3. Parents of handicapped children could accompany them to the treatment center, where the parents could not only see what was being done for their children but also could learn how to continue the treatment at home.

4. The initial interest with which parents seek and accept treatment for their cerebral palsied children could be capitalized upon, because the parents would be able to share in planning the treatment.

5. The family physician could participate more actively in the program. Because children had been sent to specialists in Buffalo, away from the private physician, there had been some antagonism to the State medical re-

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habilitation program on the part of local physicians.

6. The new program would result in considerably less expenditure of funds, and yet service could be given to many more persons.

Organization

Specialists in rehabilitation felt that an outpatient clinic in the county would be worth trying. However, although the clinic team could be administratively responsible to the county commissioner of health, a qualified person would have to be responsible for medical supervision. Therefore, an orthopedist with special experience in cerebral palsy was recruited. He resides in Buffalo and visits the county four times a year to see patients, ascertain their progress, and recommend therapy.

The orthopedist remains at the clinic from 9 a. m. to noon. He examines the patients, evaluates their progress, and, if necessary, recommends continued treatment or surgery. He also sees new cases or cases in which there is a question of the value of rehabilitation clinic service—for example, a cerebral palsy patient with a low I. Q. For these children, he will usually recommend psychological examination, which is usually done at the county mental health clinic. For all patients coming directly to the clinic, the orthopedist dictates a progress report, which is sent to the family physician; if the patient is referred by a physician, the orthopedist telephones him to discuss the case and the findings and recommendations.

Investigation revealed that the number of known handicapped persons in the county warranted the establishment of a clinic staffed by full-time personnel, and the county health department included in its 1954 budget an item of approximately $12,000 for a rehabilitation clinic. The county board of health approved the item, and the board of supervisors, the appropriating body, included it in the budget. A most influential factor in their decision was the statement that expenditures would be reduced and services increased.

Recruitment of qualified personnel was difficult but was accomplished in time for the clinic to commence limited operations in March 1954. Clinic headquarters were established in the county health department in Olean, and an additional treatment center was set up in another area having a considerable population.

Transportation of patients to the treatment centers was expected to be a major difficulty. However, there has been surprisingly little difficulty and, on the 1 or 2 occasions when transportation has been an obstacle, arrangements have been made with volunteer workers to bring patients to the treatment center.

A nominal charge of $1 is made each time a patient visits the clinic or treatment center because we believe that it helps give to the families the feeling that they, too, are contributing to the patient's rehabilitation. No extra charge is made when patients are seen by more than one therapist. The fee system is flexible, and the charge is waived when the patient or his family is unable to pay. Only once has a parent declined further treatment for a child because of the fee, and she brought the child back to the clinic when the fee was waived.

So far, most of the clinic patients are children, who have visited the treatment center twice a week for several months. The policy is not to accept children unless they are accompanied by a parent, primarily to insure parent participation in the treatment program—by watching how the child is treated and by being shown what can be done for him at home. Practice at home is strongly encouraged, and the importance of not assuming that treatment at the clinic is sufficient is stressed. Each therapy session usually lasts half an hour; if a patient receives all three types of therapy—physical, occupational, and speech—he remains at the clinic for approximately an hour and a half.

Publicity

A program was arranged at a hospital staff meeting at which all three therapists described their services. To acquaint the public—particularly those who are possible sources of referral of patients, such as physicians, schools, and social agencies—with the clinic and what it is trying to do, the county medical society was kept informed of developments. Several newspaper articles were published, with pictures. Two local service clubs donated equipment, and pictures were taken of the presentation and

published in the local newspapers. The clinic was discussed at community meetings and, in the near future, a meeting will be held with all school authorities in the county to describe the clinic services. However, informing the public about the rehabilitation services is a slow process, which must continue indefinitely.

Convincing local physicians of the value of the rehabilitation clinic and persuading them to refer patients to it also must be a continuing educational process. Most physicians recognize that a patient with a speech defect can be helped, but the concept of occupational therapy or even of physical therapy is more difficult to appreciate. Physicians will be convinced of the clinic's value if they know that patients have been definitely benefited by the treatment received there. For example, after a patient with multiple sclerosis of many years' standing was helped, his physician referred another patient to the clinic.

Coordination of Services

Fitting the county rehabilitation clinic into other programs—the State medical rehabilitation program; a recently established county medical social service; a county mental health clinic; and the county public health nursing service—required special attention.

Coordinating the new clinic with the State medical rehabilitation program was comparatively simple because many children who receive surgery under this program are referred to the rehabilitation clinic. For example, a patient with a cleft palate will be referred for speech therapy following completion of the reparative operation. On the other hand, a person attending the rehabilitation clinic may require braces, which can be purchased under the State rehabilitation program.

Since the county medical social worker is familiar with the State rehabilitation program, she knows many of the patients attending the county rehabilitation clinic, knows their problems, and can help them or assist the clinic therapists in working with them. She can also serve as a liaison between the rehabilitation clinic and the mental health clinic. All recommendations for surgery, braces, or psychological tests are transmitted to her.

Many of the children attending the rehabilitation clinic require psychological testing to determine how much benefit can be expected from rehabilitation therapy. Adult patients who find it difficult to accept their physical handicaps present emotional problems which the mental health clinic team can sometimes treat. Also, when patients attending the mental health clinic are found to have physical handicaps, they are referred to the rehabilitation clinic.

Making maximum use of the public health

nurses in the rehabilitation clinic services, however, called for more deliberation. For several months, mainly because many of the patients attending the clinic were not known to the public health nurses, we pondered the part the nurses would take in the work of the clinic. It was finally decided that they would fit into the program:

1. By referring patients to the clinic and by making the service known to those in need of it.
2. By contributing to the clinic information about factors in the patient's history and background which might affect the treatment plan.
3. By becoming familiar with the needs of patients who require considerable home treatments.

The public health nurse observes treatment in the clinic and becomes acquainted with the patient and, if the patient is a child, with the parent. Then she visits the patient in his home and helps him or the parent learn to carry out treatment in the home situation. In addition, periodic conferences are arranged at which the clinic therapists, the medical social worker, and the public health nurse discuss the progress of the patient and any problems in the home or in the environment which may have a bearing upon the treatment plan and upon the prognosis. The public health nurse develops special skills accessory to the rehabilitation clinic through inservice training.

The rehabilitation clinic team has discussed the services offered by the clinic with the vocational counselor of the State department of education. He plans to meet with the clinic team at regular intervals to discuss cases and to determine whether rehabilitation clinic service would be more practical than to have services paid for under the vocational rehabilitation program.

Results

Since the clinic commenced operation, the following types of cases have been seen: poliomyelitis, cleft palate, delayed speech, arthritis, cerebral palsy, postural difficulties, multiple sclerosis, hemiplegia, tongue-tie, clubfeet, tight heel cords, old fractures, orthodontic defects with speech impairments, lisp, hearing loss, knee injury, encephalitis, stuttering, birth injury, stroke, and paraplegia.

The following cases reviewed indicate the results that can be achieved.

CASE 1. A little girl, now 4 years old, contracted poliomyelitis in 1953, when she was 2 years old. She was left with a weak and contracted right arm, which she could not use. Physical and occupational therapy were started at the clinic on September 22, 1954, and were continued twice a week until December 1954, when sufficient function had returned to the arm to allow her to use it in feeding herself and in play.

CASE 2. A 43-year-old man was diagnosed as having multiple sclerosis. When he was first seen at the clinic, on November 10, 1954, he could not walk except with a cane and by clinging to his wife. At the clinic he was taught crutch balance, coordination, and stair climbing, and within 6 weeks he was walking alone with crutches. Occupational therapy was then started to give him confidence and to train him to make a living.

The patient is now undergoing processing by the New York State Vocational Rehabilitation Bureau, with a view to possible placement in a job. In the meantime, he operates a neighborhood store, selling light lunches, groceries, and articles of leather which he has made at the rehabilitation clinic. His personality has changed completely; self-pity has turned to determination and hope. He is independent to a large degree and is again the head of his family.

By the end of 1954, patients had made 1,130 visits to the rehabilitation clinic; 78 patients had actually been treated, and many of these were still under treatment.

The 1955 health department budget for rehabilitation has been reduced by 36 percent, and this alone is a strong point in selling the program to those responsible for appropriating tax funds for health purposes.

Although much remains to be done, particularly in coordinating the clinic services with services offered by schools and vocational rehabilitation agencies, we feel that the rehabilitation clinic is the nucleus of a workable program aimed at helping the many handicapped persons, both children and adults, in Cattaraugus County.

Clinical Laboratory Aspects of Leprosy

By LAWRENCE L. SWAN, M.D., and SISTER HILARY ROSS

ALTHOUGH the origins of leprosy probably are rooted in antiquity and the disease has been a dreaded affliction since the beginning of historic time, the etiological agent has been neither successfully cultivated in vitro nor propagated in experimental animals. As a consequence, unequivocal confirmatory laboratory tests are not available in leprosy as they are in other bacterial diseases of man. Nevertheless, numerous observations concerning the results of laboratory studies in leprosy may be found in the world literature.

In this paper, these observations, as well as our own observations based on work done at the Public Health Service Hospital in Carville, La. (the National Leprosarium), and the Public Health Service Hospital in New Orleans, will be presented and discussed in the light of present-day knowledge. It will be seen that the diagnostic laboratory procedures are limited to examination of tissues and that the abnormal clinical laboratory findings reflect, in actuality, the widespread systemic complications and sequelae of leprosy.

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Bacteriology

The human leprosy bacillus, *Mycobacterium leprae*, was the first organism reported as the etiological agent of a specific disease in man. Despite this fact, it is the only pathogenic bacterium that has not been cultured on artificial media, transmitted to animals, or even transmitted experimentally within the natural host. Attempts to cultivate the leprosy bacillus on artificial media have been innumerable, and positive, as well as negative, results have been reported. The claims of successful cultivation, however, have never been substantiated by other investigators.

Although chick embryos are susceptible to a remarkable variety of bacteria, viruses, and rickettsiae, attempts to infect chick embryos and chick tissue cultures with leprosy bacilli have also met with failure (*1*).

In 1947 Hanks studied the effect of adding *Myco. leprae* to actively growing fibrocytes obtained from the skin of patients with tuberculoid (*2*) and with lepromatous (*3*) leprosy. He observed rapid reduction of the organisms to acid-fast debris in the tissue cultures of fibroblasts from the patients with tuberculoid leprosy; the degeneration of the *Myco. leprae* was less rapid with fibroblasts derived from lepromatous lesions. Cultivation from 2 to 7 months did not result in growth of the leprosy bacillus within the fibrocytes.

Chemistry

Serum Proteins

Most investigators agree that there are profound changes in the serum proteins in leprosy. For the determination of protein values, many

workers have used chemical methods (*4–6*). The quantitative and qualitative aspects of these methods compare favorably with the more recent electrophoretic methods of fractionating the complex mixture of serum proteins, but the latter methods are more sensitive and may detect abnormal constituents of the protein mixture.

The majority of the workers who have studied leprosy serums by electrophoretic methods have used the moving-boundary type apparatus (*7–12*). Miguel and his co-workers (*13*) made use of the Kern apparatus and paper electrophoresis. No specific references were found in the literature pertaining to the examination of serum from leprosy patients by paper chromatography, column chromatography, or ultracentrifugation.

According to most of the references cited, the total proteins are normal or increased in the great majority of leprosy serums. The quantity of albumin is usually moderately reduced, and, in our experience, in one case complicated by amyloidosis, albumin was undetectable by ordinary chemical methods and only poorly demonstrated by paper electrophoresis. There is a moderate to marked hyperglobulinemia in the majority of cases, and, obviously, reversal of the albumin-globulin ratio occurs frequently in leprosy.

There is less unanimity of opinion in regard to the quantity of the various globulin fractions in leprosy. However, it seems that $alpha_2$ is the most frequently elevated fraction. Miguel and his associates reported that this fraction was above normal in 69.76 percent of the patients studied (*13*). $Alpha_1$ and beta globulin are elevated less frequently, although a majority of the reports specify an increase. All observers noted an abnormal increase of gamma globulin, and in Miguel's study the gamma globulin was above normal in 68.82 percent of the patients.

C-Reactive Protein

Serum from 100 patients at the National Leprosarium was tested recently for C-reactive protein. This abnormal protein was found in 79 percent of the patients with clinically active lepromatous leprosy and in 30 percent with clinically inactive lepromatous leprosy. It is believed that serial determinations of C-reactive protein may have some value in following the progress of the inflammatory response to *Myco. leprae* infection.

Liver Function Tests

Many of the reports of liver function studies in leprosy are based on methods now considered obsolescent or are no longer significant in the light of our better, though still imperfect, understanding of the mechanism of the reactions involved in these procedures (*14*). As should be expected, the incidence of abnormally high cephalin flocculation and thymol turbidity tests closely parallels the number of serums in which the proteins deviate from normal (*15*).

Normal values for urobilin and bilirubin in blood and urine were reported by Molinelli and Royer (*16*). It is important to note that the bilirubin test employing Ehrlich's diazo reagent diazotizes the two amino groups of the sulfone drugs. A positive test for bilirubin, therefore, would be indistinguishable from the reaction produced by the sulfones, a fact which makes this procedure as unreliable in leprosy as other liver function tests.

In our review of the literature, no reports regarding the results of the bromsulfalein excretion test in leprosy were found. Probably, bromsulfalein is excreted by the parenchymal cells in a manner similar to that in which bilirubin is excreted. Therefore, in the absence of jaundice and with normal renal excretion, this test should be one of the more useful procedures in leprosy.

Hopkins and others (*17*) reported that cholesterol was high in 14 and normal in 27 leprosy patients and that cholesterol esters were increased in the majority. Gomes and his colleagues (*18*) observed that reduction of serum cholesterol levels was proportional to the gravity of the disease, especially in febrile reactions. Lippi (*19*) noted that the serum cholesterol fell in patients with the lepromatous type and in those in serious condition. Ross (*20*) found serum alkaline phosphatase to be within normal limits in 87 percent of 102 patients. There is little information regarding the zinc sulfate turbidity test or the hippuric acid test in leprosy.

At the National Leprosarium laboratory, we have studied a small number of liver biopsy

specimens obtained percutaneously by the Vim-Silverman needle method from patients with active lepromatous leprosy. Hepatic miliary lepromata were easily identified, and *Myco. leprae* organisms were demonstrated by acid-fast staining. Hepatic amyloidosis was demonstrable histologically by crystal-violet stain in the instances in which there was 100-percent absorption of congo red. Our experience with needle biopsies of the liver has been too limited to draw definite conclusions, but the technique seems to be a very promising one for evaluation of hepatic involvement by leprosy and by amyloid. The procedure is not without hazards, however, and all established safeguards should be observed.

Calcium and Phosphorus

There is disagreement in the observations of investigators regarding serum calcium levels in leprosy. Reports of normal levels (*21–23*), of hypocalcemia (*24*) and of hypercalcemia (*25*) may be found. Wooley and Ross (*26*) found diffusible calcium to be lower than normal in leprosy patients and that it increased with clinical improvement of the disease. They reported that inorganic phosphorus was normal in uncomplicated leprosy.

Lemann and others (*27*) found no relation between serum calcium levels and the bone absorption in leprosy; however, Wooley and Ross reported that in the aforementioned series bone atrophy was shown by radiography in 44 of 53 patients whose serum was studied.

Glucose

Very little has been reported on carbohydrate metabolism in leprosy since Villela's review in 1938 (*24*). Certain of the older reports, such as those of Lai (*28*) and Otsuka (*29*), mentioned lowering of glucose tolerance. Wayson, Badger, and Dewar (*30*) stressed the high frequency of disturbance of carbohydrate metabolism in Hawaiian patients. Glycosuria was noted in 23.0 percent of 175 patients, and 80 percent had abnormal glucose tolerance curves.

More recently, Lancepleine (*31*) reported the frequency of hypoglycemia to be greater in patients with neural leprosy than in those with lepromatous leprosy, but the number of patients studied was too small to give significance to the observation. Tanioku (*32*) found some increase in blood sugar in both macular and lepromatous leprosy, but he did not consider it to be specific for leprosy. Sakakibara (*33*), however, could detect no consistency in occurrence of either hyperglycemia or hypoglycemia.

The sugar content of the blood is determined routinely on admission of patients at the National Leprosarium, and, if it is above normal, a glucose tolerance test is performed. A urinalysis is made at 3-month intervals on every patient. There are usually 20 to 30 patients in the hospital, or about 5.0 to 7.5 percent of the total, who have glycosuria.

Hematology

In 1949 Kiang and Choa (*34*) reported the results of the hemograms for 36 leprosy patients and reviewed a few pertinent references dealing with the blood picture in leprosy. Anemia was found to be frequent but never severe, and no morphologic abnormalities of the erythrocytes were noted. The reticulocytes were low, averaging 0.2 percent. For all except 4 patients, the erythrocyte sedimentation rate was increased. Leukocytosis was inconstant, and when present it was only of moderate degree and only in patients with lepromatous leprosy. The differential counts indicated that leukocytosis was due to increased numbers of mononuclear cells; however, in the untreated cases there was a definite neutrophilic shift to the left. Eosinophilia was observed in 36.1 percent of the patients, and the condition was believed not to be due to parasitism.

From the literature and from our own observations it can be stated that anemia in leprosy is seen mainly in the lepromatous type, especially in patients in whom the disease is advanced, is in a reactional crisis, or is complicated by nephrosis. The majority of workers emphasize leukopenia, but at the Carville hospital leukocytosis has been maintained occasionally over a period of years even in uncomplicated cases. Eosinophilia has been mentioned frequently; however, findings at Carville do not substantiate the opinion that leprosy

per se causes an increase in the number of eosinophils.

The erythrocyte sedimentation rate is accelerated in leprosy, especially in the lepromatous type and in mixed types (*35*). In our experience, there are no characteristic alterations in the bleeding time, coagulation time, or clot retraction.

In bone marrow from patients with leprosy, *Myco. leprae* bacilli are occasionally demonstrated in the smears as well as in the marrow particles. In a series of 32 bone marrows obtained at autopsy, we found bone marrow involvement in 6. Although there is a relatively high incidence of amyloidosis among patients at the National Leprosarium, amyloid has not been convincingly demonstrated in aspiration material from the sternal or iliac crest marrow or from autopsy material. Cytologically, the marrow usually is not remarkable.

The demonstration of *Myco. leprae* in the cytoplasm of leukocytes has been reported. Namba (*36*) observed the presence of bacilli in both neutrophils and monocytes removed from the buffy layer of sedimented citrated blood. Montel (*37*) also found bacilli by this method. He nearly always obtained positive results in generalized lepromatous cases, especially during febrile reactions, but never in tuberculoid cases.

Myco. leprae bacilli have been observed in dehemoglobinized blood. By examining thick drops of blood dehemoglobinized with water, Clouston (*38*) obtained 77.7 percent positive results in nodular leprosy. The results were negative in 21 early cases, however, and he concluded that the procedure was of no practical use in detecting early or latent leprosy. Baru (*39*) laked and centrifuged venous blood and found bacilli concentrated in the sediment. At the National Leprosarium, a similar technique revealed the presence of bacilli in approximately 50 percent of the newly admitted patients with lepromatous leprosy.

Immunology

Serologic Tests for Syphilis

It is generally agreed that there is a high incidence of biologically false positive serologic tests for syphilis in leprosy patients (*40*). A clinico-serologic study of 224 patients at the National Leprosarium was made in 1952 (*41*). The serologic tests for syphilis used were (*a*) the Kahn standard quantitative; (*b*) the Kolmer (cardiolipin) quantitative; (*c*) the VDRL slide flocculation quantitative; (*d*) the Rein-Bossak slide flocculation quantitative; and (*e*) the *Treponema pallidum* immobilization (TPI). The reactivity rates were as follows:

	Reactivity rate (percent)
Kolmer	63.4
Kahn	52.7
VDRL	46.9
Rein-Bossak	31.8
TPI	11.2

It was concluded that the reactivity rate for the *Treponema pallidum* immobilization test appeared to be consistent with the syphilis rate that might be expected in a comparable population group without leprosy.

The majority of the patients considered to have false positive tests for syphilis had lepromatous leprosy. This seroreactivity seemed to diminish with the prolongation of the disease, but there did not appear to be any correlation with the age of the patients. There was no significant relation to seroreactivity in amyloidosis of leprosy, diabetes, or carcinoma.

Universal Serologic Reaction

In his discussion of the universal serologic reaction with lipid antigen, Kahn (*42*) states that the reaction between tissue lipids and serum upon which serodiagnostic tests for syphilis are based is not primarily a syphilitic reaction but a biologically universal reaction. A special method known as the universal serologic technique seemed to distinguish specific serologic patterns in all human beings and animals. Concerning such patterns, Kahn states, "In lepromatous leprosy, the serologic pattern of the universal reaction is also apparently distinctive; yet, it is entirely different from the serologic patterns noted in either syphilis or yaws." In addition, he indicates that this test should assist in differentiation of the various clinical forms of leprosy.

Ross and Gemar (*43*) investigated the universal serologic reaction in 130 leprosy patients, 20 of whom had tuberculoid leprosy and 110

of whom had lepromatous leprosy. From analysis of the data, they concluded that there was no indication of any distinctive serologic pattern in lepromatous leprosy. In addition, the data suggested that treatment may alter the type of pattern in this form of the disease. Pinto and Zeo (*44*) also were unable to confirm a distinctive universal serologic reaction in lepromatous leprosy, and their conclusions were in agreement with those of Ross and Gemar.

Human Leprosy Antigen

Microflocculation tests employing antigens made from human leprosy material, according to the method of Castro (*45*), have been investigated recently at the National Leprosarium. Serums from 144 normal persons were all negative. Serums from 50 patients with tuberculosis were negative except for one doubtful and one positive test, and serums from 32 patients with syphilis were all negative. The overall results of the microfloccuation tests on serums from 219 leprosy patients were as follows:

Tuberculoid, inactive	13 negative; 0 positive.
Lepromatous, inactive	4 negative; 2 positive.
Lepromatous, active	23 negative; 177 positive.

These results, which are in close agreement with the original investigations by Castro, indicate that the use of antigens made from human leprosy material may be a worthwhile laboratory procedure in leprosy.

Middlebrook-Dubos Hemagglutination Test

The erythrocyte agglutination test of Middlebrook and Dubos has also been studied at the National Leprosarium (*46*). In a study of 261 cases of leprosy, it was found that the proportion of high titers was significantly higher in clinically active lepromatous cases with large numbers of bacilli than in quiescent lepromatous or tuberculoid cases. Results in a small number of cases studied repeatedly over a 1-year period suggest that there may be some correlation between the clinical course of the disease and alterations in titer.

Spinal Fluid

In 32 National Leprosarium patients, no characteristic changes were observed in the spinal fluid. This study included cell count; sugar, chloride, protein, and colloidal gold tests; and a Wassermann complement fixation test. The negative finding is in agreement with the results of other studies (*47*, *48*).

Tissue Diagnosis

From the preceding discussion, it is obvious that the reviewed clinical laboratory procedures offer no pathognomonic diagnostic information in leprosy. At this time, the laboratory procedures which are most likely to be diagnostic of leprosy are limited to (*a*) microscopic examination of biopsy material and (*b*) microscopic examination of smears from skin and nasal mucous membrane scrapings (*49*).

Examination Techniques

It is of considerable importance to select the site of biopsy or smear specimen with care. The margins of macules and areas of infiltration offer the best material.

We prefer that the biopsy specimen be obtained with a sharp scalpel and that it be sufficiently deep to include subcutaneous tissue. In this country, 10 percent formalin solution is preferred as the fixative, and the sections are stained with hematoxylin and eosin. We have found that the Fite-Cambre-Turner modification of the Ziehl-Neelsen stain to be the most satisfactory acid-fast stain for tissue sections.

In obtaining material for a smear, the skin is compressed between the fingers until it blanches, and a very small incision is made with a single edge razor or a scalpel blade. The blade is scraped through the incision at right angles to collect tissue fragments, which are spread on a glass slide. The slide is stained by the Ziehl-Neelsen acid-fast method.

Demonstration of *Myco. leprae* in leproma is not difficult; however, it is usually a laborious task to obtain bacilli in acceptable numbers from the macules of tuberculoid leprosy. Recent reports from India describe simple methods of concentrating the bacilli by tissue homogenization which are superior to the usual skin smears in such cases (*51*, *52*). These methods are being studied at the Carville hospital, and the results thus far tend to confirm the observations of the Indian researchers.

Characteristics of Three Leprosy Types

Lepromatous leprosy, one of the two polar types, is the one usually illustrated in textbooks and found in class slide sets. Except for a characteristic uninvolved zone immediately beneath the basal layer of the epidermis, the dermis is infiltrated by large, pale, mononuclear phagocytes with a slightly granular cytoplasm, the so-called lepra or Virchow cell. In the early stages of the disease, collections of these cells are oriented around capillaries and lymphatics, and, in later stages, they coalesce into homogeneous masses of lepra cells. Acid-fast stains reveal astounding numbers of leprosy bacilli in the cytoplasm and in cystlike structures called globi. Bacilli are also present in walls of vessels. No caseation necrosis or giant cells are seen unless complicating factors have altered the picture. On rare occasions, foreign-body type giant cells are present around the globi.

Tuberculoid leprosy is the other of the two polar types. Its most obvious feature is the presence of epithelioid tubercles with Langhan's type giant cells. No uninvolved sub-basal zone is present, and the picture is closely mimicked by some cases of sarcoid of the skin, tuberculosis, beryllium granulomas, and other granulomatous cutaneous lesions. In a study of the histological differentiation of nonleprous and leprous cutaneous tuberculoid granulomas at the Armed Forces Institute of Pathology, one of the authors (Swan) and Dr. Chapman H. Binford concluded that nerve involvement is seen almost exclusively in the leprosy cases. *Myco. leprae* bacilli are infrequently seen in tuberculoid leprosy, although a few may be found in most cases if a determined and vigorous search is made.

What is known as the indeterminate type of leprosy is histologically nonspecific. In this type the presence of acid-fast bacilli is rather infrequent. The dermal reaction consists of perivascular and perineural lymphocytic infiltration.

Summary and Conclusions

The cultivation of *Mycobacterium leprae* is probably the one most important goal sought by leprologists. Conclusive proof of the presence of leprosy, exact determination of activity, precise evaluation of therapeutic agents, and development of specific diagnostic tests await the cultivation of this organism. The leprosy bacillus appears to be an intracellular parasite, and it is possible that with present-day tissue culture techniques the organism will be successfully grown in vitro.

The abnormal values of serum proteins generally are considered to be due to the response of the reticuloendothelial system to leprosy bacilli. It is important to evaluate the protein values in leprosy according to (*a*) the type of leprosy from which the serum is obtained and (*b*) the activity of the disease and complicating conditions, such as amyloidosis and renal disease. It is apparent that in almost all cases of lepromatous leprosy there are abnormalities of serum proteins. The globulins are increased during acute lepra reactions and erythema nodosum leprosum, and they subside as the erythema disappears. Abnormalities of the serum proteins are rare in tuberculoid leprosy. In view of the frequency of complicating amyloidosis in leprosy, the evaluations of serum proteins are significant, especially in the light of recent evidence suggesting that amyloidosis seems to be related to the appearance of beta and alpha$_2$ globulins in the blood of experimental animals (*53*).

The cephalin flocculation and thymol turbidity tests are abnormal in leprosy because of the quantitative, and possibly the qualitative, variations in the serum proteins. The reduction of serum cholesterol levels, as reported by most observers, is more in keeping with what is known concerning cholesterol metabolism and excretion. The relationship between free and esterified cholesterol seems not to have been adequately studied in leprosy. The low serum cholesterol levels in active lepromatous leprosy suggest that there is hepatic involvement, a condition which the finding of lepromata and organisms in needle biopsies of the liver seems to confirm.

Other clinical chemistry tests reviewed do not appear to be altered by leprosy per se.

Hematology offers little in the diagnosis of leprosy. The presence of organisms in the cytoplasm of circulating leukocytes or in smears from laked blood is usually seen only in cases

in which organisms can be demonstrated more easily from smears of cutaneous lesions. Bone marrow examination likewise contributes little to the diagnosis of the disease.

False serologic tests for syphilis in leprosy are well known and have made the diagnosis of concurrent syphilis difficult unless spirochetes are demonstrated. The recent results of the *Treponema pallidum* immobilization test in patients with leprosy suggest that the false biological positive reactions have been eliminated.

The Middlebrook-Dubos hemagglutination test reveals that leprosy probably produces antibodies which cause agglutination of red blood cells that have been sensitized with tuberculin. The microflocculation test of Castro, from the serologic point of view, may be assumed to be a diagnostic test for leprosy. We believe that this test may be of value as a routine laboratory procedure in the detection of overlooked cases of lepromatous leprosy in endemic areas.

It is our opinion that at the present time examination of tissues is the best method of making a laboratory diagnosis of leprosy and of classifying the disease as to type. The concentration of organisms by homogenization of tissue is perhaps the method most likely to demonstrate organisms in all types of leprosy. Meticulous technique and cautious interpretation of results are essential for proper utilization of this procedure.

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Conference Report

SIX BRIEFS of papers presented at the 13th annual meeting, May 6–9, 1955, Mexico City, appear on the following pages. The official publication of the association is the *Boletin de la Oficina Sanitaria Panamericana*, in which one may expect to find Spanish versions of the conference papers.

Good Health at the Border

PHR brief

Unsolved public health problems exist at practically every point where communities meet at the boundary line between the United States and the Republic of Mexico. But none are of greater magnitude than the public health conditions along the Rio Grande, which separates Texas and Mexico.

Morbidity statistics per 100,000 population for 1953 illustrate the lack of good health in the 11 border counties of Texas. The tuberculosis morbidity rate is 128.8; for the entire State it is approximately 56.8.

Gonorrhea and syphilis rates for the entire State are 267.2 and 89.4; for the 11 border counties they are, respectively, 397.3 and 199.5.

Bacillary dysentery and amebic dysentery rates for the entire State are 197 and 6.5; for the 11 border counties they are 923.6 and 30.2.

The infant mortality rate, one of the most sensitive indicators of the state of public health in any population was 48.7 per 1,000 live births in these 11 counties; for the entire State it was 34.3.

One border county annually reports 3 times the number of shigellosis cases that are reported by all the other 253 counties of Texas.

The flow of migratory labor into Texas has increased the scope of public health problems in the border counties. Little has been done, however, to meet the health needs of incoming legal "braceros." Frequently, labor contractors neglect making arrangements for the health, safety, and comfort of the migratory workers they transport.

Rest stations have not been provided at strategic points for these people in transit. Little in the way of proper housing and basic sanitary facilities has been provided for these laborers at their employment destinations.

Standard Health Units

What can be done to help us reach our mutual goal of good health at the border? Most problems of public importance can be solved by the community when people understand the necessity of finding a solution to their problems.

The satisfactory solution of community health problems can best be approached through the services of a standard full-time health unit. Local health units or their counterparts along each side of the boundary line would eventually achieve our mutual goal.

I hope to be able to report at some future meeting of the United States-Mexico Border Public Health Association that every county on the Rio Grande is served by an accredited full-time health unit and that all other Texas counties are also covered by such a service.

The basic professional team needed for the local health unit consists of—

- One or more licensed physicians who have had graduate training in public health administration.
- At least one dentist with training in public health dentistry.
- A corps of nurses who are qualified through training, experience, and skill to give communitywide public health nursing.
- A sanitary engineer and a sufficient number of properly trained sanitarians to assure the environmental safety of the local community.
- Skilled laboratory personnel to verify and support the technical efforts of other staff members.
- A trained and skilled health educator to correlate the educational effort of the unit.
- Sufficient nonprofessional personnel to carry out the routine work of the unit.

Functioning on a county or multicounty basis, the standard health unit—

- Collects and analyzes morbidity and mortality statistics, for use in planning and carrying out programs aimed at raising local health standards.
- Makes epidemiological studies and, in cooperation with the local medical profession, institutes appropriate measures in the control of communicable or preventable diseases.
- Supervises and administers a continuing program of environmental sanitation, which will assure the community a safe water supply, proper disposal of industrial and human waste, protection of all food sources, control of insects

By Henry A. Holle, M.D., State health officer, Texas.

Setting the Pattern

The United States-Mexico Border Public Health Association has demonstrated that our two countries can live peacefully side by side and solve our problems at the council table in a democratic fashion. Learning to live peacefully with one's neighbor is one of the highest attainments yet to be reached in the public health field.

—Victor M. Ehlers, director, division of sanitary engineering, Texas State Department of Health, Austin, Tex.

and rodents, and the elimination of health hazards and nuisances.

- Conducts projects to promote better health for mothers and children, through maternal and child health clinics.
- Promotes dental health, through clinical demonstrations, education in dental hygiene, and corrective services provided by local dentists.
- Provides those laboratory services which are prerequisite and directly related to the successful administration of the overall public health effort in the community.
- Carries out consistent programs of community education through available channels, to guide individuals and groups toward better individual and community health.

Border Health Units

In developing local health units along the border, we shall give special attention to staffing with persons who speak English and Spanish fluently, and who are best qualified to cope with the health problems common to all communities along the Rio Grande. These communities will cooperate with Mexican health authorities in every possible way.

Much has been gained by public health personnel who participated in the environmental sanitation training seminar at Laredo, Tex., sponsored by the Pan American Sanitary Bureau, the Ministry of Health and Welfare for Mexico, the United States Public Health Service, and the Texas State Department of Health.

The success of the seminar points to the great need for a special training agency to reach all types of health workers on both sides of the international boundary. In the event the establishment of a special agency is not immediately possible, we can all work toward expanding in-service training programs along the border to include all categories of health personnel from both countries. It is desirable that we also work out a program for the exchange of public health personnel working on each side of the border.

Even with the very best international and intranational cooperation, we still face an uphill fight. I venture to say that it was best we did not adopt a plan considered in the 1930's, which would have turned over to an international commission the matter of public health administration in the border counties and municipalities. It would have destroyed local initiative in developing adequate community public health resources. Properly staffed and equipped local health departments, encouraged and assisted by state and federal governments, can ultimately attain our goal.

A Natural Resource

PHR brief

Under construction in Mexico City and soon to be completed is the sewage treatment plant of Chapultepec. From the sewage the plant will produce liquid activated sludge and humus for agricultural purposes.

The new plant will be used as an experimental laboratory for the Sanitary Engineering School of the National University of Mexico. This school is sponsored by the Ministry of Health and Welfare through its division of experimental studies in public health. Other research will be conducted at the several installations of the sewage treatment plant.

Soon to be in operation is a pilot plant to treat the sewage of the Grand Canal, Mexico City. Over a year's time, a daily chemical analysis has been made of 24-hour composite samples. The outcome of this study will de-

By Raúl Enrique Ochoa Elizondo, engineer, Departamento de Obras Hidráulicas del Distrito Federal, México, D. F.

termine the design of corresponding subsidiary installations.

For more than 10 years the problem of treating sewage in Mexico City has been a cause for public concern. During this period the problem was aggravated by a diminishing water supply.

The falling level of Xochimilco Lake, one of the main tourist attractions of Mexico City, led the Departamento del Distrito Federal to endeavor to preserve the lake and by so doing to improve its actual sanitary condition. The department has recommended that treated sewage be used to supplement the rainwater that normally flows into the lake in order to maintain the water level.

The water in some of the wells formerly used for watering public gardens has been exhausted. This is true particularly of the Bosque de Chapultepec, which is the main public park in the city.

As part of the general attempt to solve the problems of sewage and water supply, it is planned to establish a closed cycle in the rational use of the waters in the Mexico Valley basin. It is economically desirable to take part of the city water supply from the deep ground water in the valley, which at present is used for irrigation purposes, and to use the treated sewage for irrigation. The sludge is also used for fertilizer to replace the nutrients removed from the soil.

Exchange of Rabies Reports

We recognize the importance of mutual cooperation in solving the problems of rabies along the United States-Mexico border. The Texas-Mexico border is long, and the Rio Grande River is not an effective barrier against the rabies virus.

Let us attempt to share reports on the laboratory findings of rabies along the border. The Texas State Health Department will be pleased to send its monthly report on rabies and other animal diseases to interested persons in Mexico. In exchange we would appreciate having copies of similar reports and other significant information regarding rabies along the border.

—J. V. Irons, M.D., director of laboratories, and R. B. Eads, Ph.D., principal entomologist, Texas State Department of Health, Austin, Tex.

Wildlife Rabies Control

PHR brief

Rabies is as much, or more, a problem of agricultural economics as it is of public health. During 40 years' experience in controlling animals harmful to man, the Fish and Wildlife Service of the United States Department of the Interior has learned two basic truths about rabies in wildlife.

By Clifford C. Presnall, assistant chief, Branch of Predator and Rodent Control, Fish and Wildlife Service, United States Department of the Interior, Washington, D.C.

The disease can often be stopped, or greatly limited, by reducing without actually exterminating the population of wolves, coyotes, and foxes. Rabies epidemics seldom start where these animals are kept from becoming too numerous.

The numbers of these animals can be kept low without great expense and without danger to beneficial animals, domestic stock, or mankind. An incidental benefit is a reduction in the number of livestock killed and eaten by predators.

Applied with success for many years in the United States, these principles have been used with good results along the border between Mexico and the United States. Since the informal Nogales agreement was made on April 26, 1949, a joint program of rabies control demonstrations has operated in a 150-kilometer zone on both sides of the boundary.

Regular Predator Control

All of the work north of the border has been part of the regular predator control program which the Fish and Wildlife Service operates in cooperation with State and county agencies and local livestock associations. This work has

kept predators from becoming abundant along much of the border with the result that there has been little rabies among either wild or domestic animals.

During the past 6 years there have been only two outbreaks of rabies among wildlife in the control zone: one among coyotes and foxes in San Diego County, Calif., and the other in Santa Cruz County, Ariz. A few other cases of rabies have been known among domestic animals in Arizona also.

In the New Mexico portion of the zone there has been no wildlife rabies reported during this time. Texas reported only one rabid coyote along the border.

South of the border the amount of rabies reported among wildlife has been equally small. Within the zone, however, few animal heads have been available for examination because there has been little trapping of foxes and coyotes.

Public interest in coyote and wolf control has been most active in border areas of Chihuahua, Sonora, and Baja California. Six small demonstrations of control methods have been held in these Mexican states since the agreement for joint action—all with the joint aid of the Pan American Sanitary Bureau, the United States Fish and Wildlife Service, federal or state agencies, and local livestock associations.

In Chihuahua, and to some extent in Sonora, the local livestock associations have carried on the work during the intervals between demonstrations. In all demonstrations, the work has been hampered by movement of wolves and coyotes from large uncontrolled areas into the small controlled areas. Results of the demonstrations show that similar work all along the border would be desirable. These results are best shown west of Nueva Casas Grandes, Chihuahua, where control has been effective during the past 5 years in an area which varied from 1,000 to 4,000 square kilometers.

A recent survey of the Casas Grandes area revealed a low population of wolves and coyotes, similar to many parts of the United States where no rabies outbreaks have occurred since the excess numbers of predators were first reduced some 35 years ago. The wolf and coyote population is now low enough to make it unlikely that rabies could spread rapidly. There has also been a great reduction in loss of livestock since predators were controlled.

Ranchers report that the number of sheep, calves, and other livestock killed by predators is now only a small fraction of the number killed before 1950. One herd of cows produced twice as many calves in the year after predator control as in the year before. Thus, the work directly benefits both the health and economics of the area.

Economic Benefits

Economic benefits are more easily seen by cattlemen than are health benefits. It is logical for them to support measures which help raise and sell two calves rather than one. Most people give little thought to benefits to health until they become sick. Then it may be too late.

The same applies to rabies control, which is seldom given any attention until the outbreak occurs. By controlling the domestic and wild carriers of rabies before an epidemic starts and by removing the excess numbers of wolves and coyotes, continuously and on a wide scale, we can decrease the danger and expense of repeated local outbreaks.

The small rabies control areas along the United States-Mexico border have demonstrated the suitability of methods for preventing spread of the disease among wildlife and of reducing livestock losses. The time now seems ripe for action which will aid broad-scale application of the idea throughout the entire border zone.

Mosquitoes and Encephalitis

PHR brief

An epidemic of St. Louis encephalitis in August 1954 affected 600 people in Hidalgo County, Tex., causing at least 2 deaths. Local physicians, baffled by the nature of the disease, called it poliomyelitis. Naturally, alarm re-

By Sam L. Warrington, B.S.C.E., sanitary engineer, Hidalgo County Health Unit, Edinburg, Tex.

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sulted from reports of 92 cases of "poliomyelitis" in 1 week.

Countywide Control

Hidalgo County has a population of 180,000, with 12 cities ranging in size from 5,000 to 25,000. The county lies on a flat delta on the Rio Grande across from Tamaulipas, Mexico. A vast irrigation and drainage system affords many ideal mosquito-breeding potentials.

No mosquitoes in the area had been known to transmit encephalitis. *Culex quinquefasciatus*, the most numerous species, proved to be the vector responsible for carrying the encephalitis virus from wild birds to man.

Working on the assumption that the Hidalgo County epidemic was mosquito-borne, insect control specialists began a mass mosquito-killing campaign. The county health unit furnished the supervision, equipment, and crews for larviciding all breeding places within each city and for about a mile around the fringe areas. The cities paid for the chemicals used for spraying and for the gasoline for the trucks.

At first we thought that we could control the mosquitoes by finding and larviciding all the water holes. It didn't take long to discover that we were missing too many breeding places on private premises for this measure to be effective. To kill the larvae, 5 percent DDT and diesel oil were applied on all standing water. To kill adult mosquitoes, a 3 percent gamma isomer benzene hexachloride (BHC) dust and 5 percent DDT and water were used in turbine sprayer-dusters in all of the cities.

The epidemic began to subside before the mosquito control activities had been completed in all the cities. Continuous collections of mosquitoes are being made and studied by the laboratories, however. As late as January 1955, the virus was still present in the mosquitoes. Since then, two cases of encephalitis have been reported, although one patient later was found to be suffering from a blood clot.

In the likelihood of another epidemic, unless mosquito control continues, it is planned that the county and cities will share the expenses of control operations. For adult mosquito control, the cities which have fogging machines or dusting equipment will continue to fog with them. For the cities which do not have space-spraying equipment, the county health unit has purchased a jeep-mounted turbine sprayer-duster. Space spraying will be done for the cities on a fee basis.

From our mosquito control efforts we have learned that larviciding plus fogging with 5 percent DDT and diesel oil in a dynafog gave good control for about a week. Larviciding plus space dusting with 3 percent gamma BHC and space spraying with 5 percent DDT and water gave good control for a longer period than with the fogging machine.

El Paso-Juarez Area

PHR brief

El Paso and Juarez are the two largest cities in their respective countries on the United States-Mexico border. They are contiguous, being separated only by the Rio Grande, a narrow sandy stream which can be waded most of the year round. The northbound traffic amounts to 18 million people a year. Southbound traffic is only slightly less. Thus, there are many joint sanitation problems.

Joint Insect Control

Mosquitoes, more of a nuisance than a public health problem, breed in thousands of ditches, irrigation boxes, and culverts—all close to thickly settled suburban developments. Most of these breeding areas can be reached only by foot. The breeding is enhanced by the fact that much of the Mexican irrigation water contains a high percentage of sewage, which tends to seal the ground, preventing the water from drying away between irrigations. The sewage also furnishes abundant organic matter to feed the larval stage.

For control, we use 5-gallon knapsack sprayers containing stove oil of 40 gravity with 2 percent benzene hexachloride (BHC) in solution. The oil is sprayed on the mosquito-breeding water surfaces and effects a suitable kill. The

By J. Harold Tillman, B.S.C.E., sanitary engineer, El Paso (Tex.) City-County Health Unit.

El Paso Health Department furnishes the equipment, insecticide, and some supervision, and the Juarez Health Department furnishes the labor and some supervision.

The housefly does not recognize international boundaries either. In addition to the usual fly sanitation control, we have a supplementary program which consists of spraying garbage cans and pit privies along public streets and alleys with a residual type of insecticide. This is a concurrent program with Juarez rather than a joint program.

Because flies rapidly become resistant to various residual chemicals, we change insecticides each year. We plan to change to malathion, Malarin, and a new product called Die-Fly. Sugar is added to attract the flies.

A few years ago the Texas State Department of Health conducted a 4-day course for training health department personnel and people in industry responsible for fly control. Six inspectors from the Juarez Health Department attended the course, held in El Paso.

Voluntary Cooperation

As a result of the efforts of the first international committee on diarrhea and enteritis, in El Paso the infant death rate per 100,000 has dropped from 54.6 in 1951 to 13.6 in 1954, and Juarez has had a similar improvement. Representatives from the two cities form the committee, which was organized several years ago.

Theirs is a completely voluntary program, sponsored by the two local health departments and the Central Council of Social Agencies. Volunteers armed with demonstration equipment and pamphlets have visited each home in areas having the most cases of diarrhea and enteritis. Mothers were told how to protect their baby's food and what to do when the child first shows signs of illness.

El Paso has oil refining, smelting, brickmaking, woodworking industries, packinghouses, railroads, quarries, and a fertilizer plant. For several years we have had a voluntary program of air pollution abatement. Our mayor set up a smoke control committee to work with the industries on a voluntary abatement program. When we had made every improvement possible by this means, we recommended a smoke control ordinance, but industry promptly proposed that it set up its own policing committee to handle individual complaints and to strive for further air pollution abatement. This is the program now in effect.

The Rio Grande flow has been decreasing for years. At the same time, the waste load has been rising. Stream pollution is heavy with discharges from sewage plants and industries. Only a small part of this pollution comes from Mexico.

El Paso is building a secondary sewage treatment plant to treat an effluent of about 12 million gallons daily. The El Paso County water improvement district is building two other secondary treatment plants. A large packinghouse has built a plant to treat its waste discharges. These latter treated discharges, now used for irrigation on Mexican soil, no longer enter the Rio Grande directly except in winter.

By mixing sewage with irrigation water and well water and using the mixture for land irrigation, Juarez has corrected an odor nuisance caused by the discharge of sewage into a drainage ditch parallel to the river.

Ways of Cooperating

When El Paso and Juarez conducted a joint rat-typhus survey in 1946, sampling points were set up in both cities. Men from both health departments worked side by side in the program. Although neither city had any human cases of typhus, 25 percent of the rats caught were infected. In the 1951 survey 5 percent of the rats were infected.

The sanitary landfill in El Paso was located adjacent to Cordova Island, a portion of Mexico north of the river. A wire fence is the international boundary at that point. The health officer of Juarez protested the location of the fill, stating that he had an almost impossible police problem to keep citizens from crossing the fence to rummage in the fill for salvage, which he felt was a health menace. Locating another site for the fill away from the boundary solved the international phase of this problem.

Vegetables, pineapples, strawberries, bananas, and shrimp are part of the international food traffic from Mexico to the United States. The United States sends corn, beans, and rice into Mexico. All foods are inspected on both

sides of the river. One El Paso company proposes to import grade A milk from a Juarez dairy. Another proposes to import ice if our local requirement that ice be manufactured from distilled water can be met.

Many of the sanitarians in the Juarez Health Department have earned certificates from our food-handlers school. Juarez has initiated a similar school.

There is no "iron curtain" here. The only curtain between our two cities is an occasional curtain of dust, not man-made. Cooperative, friendly relations exist between us and our esteemed Mexican neighbors.

Mosquito Source Reduction

PHR brief

It is understandable why mosquitoes have become and bid to be even more of a formidable problem to the State of California. The water resources of the State are now developed to approximately one-half of that planned. The State will have approximately 17 million irrigated acres when all the irrigable land is developed. The present irrigated acreage is about one-fourth of all the irrigated land in the United States.

California's mosquito abatement problem is dealt with by more than 50 local control programs. The control technology utilizes preventive and corrective environmental measures, augmented chiefly by insecticides. Scientific studies are seeking improved methods of control, of mosquito measurement, of neutralizing the vector of encephalitis.

A Changing Problem

Organized mosquito abatement has been in existence in California for more than 40 years. During this time four distinct periods have characterized control effort. They might be classed as follows:

Reclamation period—This period utilized the engineering approach in obtaining control since the principle of drainage was the foremost control measure employed. Extensive land reclamation was the result.

Petroleum period—To a great extent petroleum oils served as a partner to drainage during the reclamation period, being relied on increasingly from the beginning of organized mosquito control in California through World War II.

Chlorinated hydrocarbon period—The movement leading from DDT's dramatic initiation by the military forces during the war to its almost unrealistic use for civilian purposes later served to the detriment of the environmental sanitation approach toward mosquito abatement and fly prevention. Nature soon responded, and after several years domestic flies and certain mosquitoes became clearly resistant to DDT, lindane, toxaphene, chlordane, heptachlor, aldrin, and dieldrin.

Mosquito source reduction period—Partly in response to insecticide resistance, there has been a return to progressive elimination of mosquito sources through engineering methods.

The primary reason for this shifting emphasis has been in response to a changing mosquito problem, arising to a great degree from the accelerated program of water resources development. The increase in irrigation practices, the rapid growth in population, and the rapid industrialization of the State are also contributing factors.

The Present Program

Our State and local program is of necessity hinged on preventing mosquitoes from developing at their source. Provision of adequate drainage or for re-use of excess water in new irrigation developments, effective land preparation, and judicious land and water management practices are our means for prevention of new mosquito problems.

Efforts are being made to get cooperation from other public agencies. Close working relationships have been developed between the farm advisers and the mosquito abatement districts and with irrigation districts, soil conservation agencies, and wildlife interests. Insecticides are relied on as supplemental measures. Wherever mosquito resistance to chlorinated hydrocarbon insecticides has devel-

By Richard F. Peters, B.S., chief, bureau of vector control, and Frank M. Stead, M.S., chief, division of environmental sanitation, California State Department of Public Health.

oped, phosphate-type insecticides have been substituted.

The bureau of vector control of the California State Department of Public Health is studying the ecology of the important mosquito species in the State as a basis for determining the most efficient control measures.

Every aspect of irrigation practice and mosquito production on irrigated pastures is being investigated with the aim of trying to break the mosquito life cycle at its most vulnerable point. The belief exists that the most probable gains in control can be made in positively or negatively influencing egg hatching.

A companion study of mosquitoes in rice fields is likewise receiving attention. Both *Culex tarsalis*, the vector of encephalitis and the most common mosquito in the State, and *Anopheles freeborni*, the vector of malaria, flourish in a ricefield habitat. The most promising lead is related to the influence of blue-green algae upon mosquito larvae.

An ecologic study of mosquitoes in row crops, particularly in cotton fields, is now under way. California has approximately 1 million acres of cotton. The full importance of this crop to mosquito production is only vaguely understood.

Encephalitis Studies

The two important types of encephalitis in California, the western equine and St. Louis strains, are transmitted principally by *C. tarsalis*. The disease is endemic in the Central Valley, but infection has also been recorded in other areas.

In an effort to seek more information about encephalitis and its relationship to humans, horses, mosquitoes, and other intermediate animals, several bureaus of the State health department, as well as the Hooper Foundation for Medical Research, the University of California School of Public Health, and the Public Health Service, are engaged in intensive research.

The department is making annual collections of *C. tarsalis* on a weekly basis from May 1 until October 31. Fifty pools a week are processed for the presence of the encephalitis virus by the State viral and rickettsial disease laboratory.

Attempts are being made to interpret the significance of mosquito infection as it relates to occurrence of the disease. This involves careful measurement of the mosquito density and of animal and bird populations in the vicinity of mosquitoes known to possess the virus. One obvious inadequacy in accomplishing this study, which will take a number of years to make more meaningful, pertains to existing methods of mosquito population sampling. The State bureau of vector control will determine whether a more sensitive method of objective sampling is obtainable.

PHR

A survey of sanitarian education, experience, and training, such as the questionnaire study described here, accents the administrative need for inventories of sanitation personnel.

A Pilot Survey of Sanitarians and Their Background

By HENRY R. O'BRIEN, M.D., M.P.H., and ARTHUR H. NEILL, C.E., M.P.H.

YESTERDAY, environmental health services were performed chiefly by the sanitary inspector on the one hand and the sanitary or public health engineer on the other. Today, there appears between them the modern sanitarian. While the exact duties of the modern sanitarian and his qualifications are subjects of debate, we know that since he handles complex situations he requires a broad educational background. At the same time, he does not have the training of the sanitary engineer, who is prepared to deal with the design, construction, and operation of water or disposal plants.

Dr. O'Brien, recently retired from the Public Health Service, is with the Pennsylvania State Department of Health as director of professional training. After 4 years of service in Region III, Mr. Neill is now acting chief, Technical Services Section, General Engineering Program, Division of Sanitary Engineering Services, Public Health Service.

Arthur P. Miller, sanitary engineer director, Division of Sanitary Engineering Services, acted as consultant in planning the study described in this paper, which was originally presented at the 23d annual meeting of the Southern Branch of the American Public Health Association, May 11–13, 1955, New Orleans. Other papers presented at the Southern Branch meeting appear in brief in the September 1955 issue of Public Health Reports, p. 914.

All three, the engineer, the sanitarian, and the inspector, are concerned with matters of environmental sanitation. The dividing line between the sanitarian and the sanitary inspector is not always drawn clearly, but a distinct line is becoming visible in places. The future may see fewer of the latter and more of the former. This survey and other studies may help define our goals and shape our definitions.

This paper uses the term "sanitarian" in its broadest sense, to include the great number of those doing field work in the sanitation of the environment. We include staff members and their supervisors and omit those who hold engineering degrees, as well as laboratory workers and laborers.

The people we are considering are the second most numerous group in public health. Only public health nurses outnumber them. The contribution of sanitarians to public health progress is significant and important, for these men are in intimate and daily contact with the community's environmental needs. They may deal with only one phase of environmental health, such as milk or plumbing sanitation, or they may handle more generalized programs. They may enforce regulations or use more educational processes.

How sanitarians are being trained is therefore important even beyond the need for training all of us share in public health. Sanitarians come to the health department with

widely varied educational background and job experience. Most of them have to be trained from the beginning. It is accepted practice that in planning any inservice program of education we study such items as the trainee's age, schooling, experience, and previous practical training.

Because information on these points was lacking in the States included in Region III of the Public Health Service (Washington, D. C.), a questionnaire was prepared to secure this information for selected areas. Copies of the questionnaire were distributed to the individual sanitarians in May and June 1954, through the health department of a State (Maryland), a city (Baltimore), a large island (Puerto Rico), and a small island group (the Virgin Islands), which are all within Region III and offer some contrast with each other. If the pilot study proved worth while, it was planned to extend it to other States in Region III, and perhaps elsewhere.

In all, 491 replies were returned as follows:

Maryland:	
State health department	5
County health departments	68
Private industry (milk plants)	11
Total	84
Baltimore:	
City health department:	
Industrial hygiene	6
Food sanitation	12
Housing sanitation	19
Meat inspection	18
Milk sanitation	12
Rodent control	12
General community sanitation	13
Plumbing inspection	7
Health department total	99
Sanitary corps (police department)	24
Private industry:	
Grocery chains or railroad dining cars	22
Milk plants	19
Total	164
Virgin Islands	10
Puerto Rico:	
Vector control	10
General sanitation:	
Supervisors	22
General community sanitarians	201
Total	233

The returns from official health departments apparently include all the sanitary staff. The number of sanitary workers (52) paid by private industry in the State of Maryland, including Baltimore, is probably not complete. Doubtless, there are still others in industry whose work is broadly like that of a health department sanitarian. Those of us who are in Government service might be more alert to searching them out, for we are all working in community sanitation together, and the advantages of training should be extended to sanitation personnel wherever possible.

Analysis of the Tables

Some of the findings of the questionnaire are included in various tables and are touched on in this discussion. The samples of information included in the tables and the groupings in which they are presented illustrate some of the ways in which the returns of similar questionnaires can be studied. We caution that the data reported here are limited in scope. However, from such types of information in our own area we should be able to determine what kind of sanitary workers we are getting. Are they the kind we want? How are we training them? How do we compare with our neighbors, with ourselves some years ago? Are we moving in ways we want to go?

Population Ratio

Our first interest might well be the number of sanitarians employed by health departments in relation to population. Baltimore City and Puerto Rico are much alike in this respect. In Baltimore, 1 sanitarian is employed for each 10,060 persons in the population. In Puerto Rico, the ratio is 1 to each 9,532. Maryland outside of Baltimore shows 1 sanitarian for each 20,904 persons. The Virgin Islands ratio is 1 to 2,200, but there the population is scattered over 3 islands.

Age, Education, and Salary

The relation of age and level of education attained before employment is an appropriate study. Figures for Maryland appear in table 1. The table might be interpreted in this fashion: Most of the men with less than average

Table 1. Relationship of age and education attained by Maryland sanitarians,[1] 1954

Age group (years)	Second college degree[2]	First college degree[3]	High school graduation[4]	Some high school	8th grade or less
24 and under		1			
25–29		10	2	1	
30–34		9	3		1
35–39	3	4	4		
40–44	2	3	3	1	
45–49	1	3	2	1	
50–54		2	3	2	1
55–59	1		3	3	2
60–64		1	2		1
65–69				2	
70–74			1	1	
Not stated		2	1		2
Total number	7	35	24	11	7

[1] Excluding sanitarians in Baltimore. [2] Master's degree or doctorate. [3] Bachelor's degree. [4] But lacking college degree.

Table 2. Educational progress of all sanitarians in areas studied, 1954

Schooling completed	Total	Maryland	Baltimore	Virgin Islands	Puerto Rico
	All sanitarians				
Total number	491	84	164	10	233
8th grade:					
Number	464	75	150	8	231
Percent of total	95	89	92	80	99
High school:					
Number	372	66	109	6	191
Percent of total	76	78	66	60	82
College:					
Number	125	42	60	0	23
Percent of total	25	50	37		10
	Sanitarians with less than 4 years in present service				
Total number	172	40	51	4	77
8th grade:					
Number	[1] 169	40	[1] 48	4	77
Percent of total	98	100	94	100	100
High school:					
Number	160	35	44	4	77
Percent of total	93	83	86	100	100
College:					
Number	68	27	27	0	14
Percent of total	40	68	53		18

[1] The 3 sanitarians who had not finished the 8th grade were not in the health department.

schooling are in the older age groups. When these workers were in their boyhood, fewer children went on to finish high school, or even grade school. It might be that the 5 who attended only grade school and the 11 others who did not finish high school would raise problems in inservice education, though their maturity and experience will aid them.

Another grouping summarizes the educational background of sanitarians in the four areas studied (table 2). About three-fourths of the sanitarians in each area—more in Puerto Rico, fewer in Baltimore and the Virgin Islands—finished high school. Half of the Maryland workers, a third of those in Baltimore City, and a tenth of those in Puerto Rico had college degrees. None in the Virgin Islands had college degrees. And in no area had every sanitarian finished grade school.

The figures change greatly when we consider only the 172 sanitarians with less than 4 years in the present sanitation service. All health department appointees have finished the eighth grade. More than 90 percent of the new sanitarians are high school graduates, and 40 percent have college degrees. This trend is distinctly encouraging. The knowledge helps in

Table 3. Major fields for degrees among sanitarians in Baltimore, State of Maryland, and Puerto Rico, 1954

Major	Total	Baltimore		Maryland	Puerto Rico
		Private industry	City		
Total number of sanitarians	125	11	49	42	23
Biology	21	2	5	4	10
Chemistry	12	2	4	2	4
Bacteriology	3		2	1	
Pharmacy	3	1	2		
Agriculture	21	2	1	13	5
Law	5		3	2	
Education	9		2	7	
Science, mathematics	10		7	1	2
English, philosophy, psychology, history	12		7	5	
Government, sociology	2		2		
Other subjects	21	3	11	6	1
Not stated	6	1	3	1	1

fixing the level of instruction of new workers.

It is worth while to see the fields in which staff members with degrees have done their major work, as shown in table 3. The number of sanitarians with major work in biology, chemistry, science, and mathematics is expected. The large number in agriculture might surprise some. But certainly law, education, English, philosophy, and history are not conventionally listed among the expected basic requirements for a sanitarian. It would be worth while for the competent administrator to ponder on the work of the individuals on his staff, as reflecting their college training, and come to his own conclusions. He may reach the opinion that nonscientific courses are better preparation for dealing with the public than scientific training or that the course itself does not matter so much as the candidate's personality, or he may return to a preference for the biological sciences.

Three tables (tables 4–6) express in various groupings the relationship of salary and education level in State, local, and private industry sanitarians. In general a greater degree of education is recognized with a higher salary. Yet other influences are at work also. The level of salaries in Puerto Rico and the Virgin Is-

Table 4. Relationship of salary and education level attained by Maryland sanitarians,[1] 1954

Salary group	Second college degree [2]	First college degree [3]	High school graduation [4]	Some high school	8th grade or less
$2,500–$2,999	-------	1	1	1	2
$3,000–$3,499	-------	1	2	5	-------
$3,500–$3,999	-------	20	3	2	5
$4,000–$4,499	3	6	14	3	-------
$4,500–$4,999	1	3	3	-------	-------
$5,000–$5,499	1	1	1	-------	-------
$5,500–$5,999	1	2	-------	-------	-------
$6,000–$6,499	1	1	-------	-------	-------
Total number	7	35	24	11	7

[1] Excluding sanitarians in Baltimore. [2] Master's degree or doctorate. [3] Bachelor's degree. [4] But lacking college degree.

Table 5. Educational background and salaries of sanitarian groups in Maryland,[1] Virgin Islands, and Puerto Rico, 1954

Education and income	Total	Maryland			Virgin Islands	Puerto Rico		
		State	County	Private industry [2]		Supervisors [3]	Insect control sanitarians	General sanitarians
Total number of sanitarians	327	5	68	11	10	22	10	201
	Schooling completed							
8th grade	314	5	61	9	8	22	10	199
High school	262	5	53	8	6	22	7	161
College	65	5	32	5	-------	22	1	-------
	Salary bracket							
Under $2,000	175	-------	-------	-------	7	-------	4	164
$2,000–$2,499	43	-------	-------	-------	3	-------	5	35
$2,500–$2,999	7	-------	4	1	-------	-------	-------	2
$3,000–$3,499	21	-------	8	-------	-------	12	1	-------
$3,500–$3,999	37	1	28	1	-------	7	-------	-------
$4,000–$4,499	28	2	19	5	-------	2	-------	-------
$4,500–$4,999	7	-------	5	2	-------	-------	-------	-------
$5,000–$5,499	3	-------	3	-------	-------	-------	-------	-------
$5,500–$5,999	3	1	-------	2	-------	-------	-------	-------
$6,000–$6,499	2	1	1	-------	-------	-------	-------	-------
Not stated	1	-------	-------	-------	-------	1	-------	-------

[1] Excluding sanitarians in Baltimore. [2] Milk plant inspectors. [3] With degree of master of sanitary science.

Table 6. Educational background and salaries of sanitarian groups in Baltimore, 1954

Education and income	Total	Sanitary police	Private industry sanitarians		City health department sanitarians							
			Foods	Milk plants	Industrial hygiene	Foods	Housing	Meats	Milk	Rodent control	General sanitation	Plumbing
Total number of sanitarians	164	24	22	19	6	12	19	18	12	12	13	7
	Schooling completed											
8th grade	150	17	21	17	6	12	19	18	11	10	13	6
High school	109	6	15	14	5	12	17	9	11	10	12	------
College	60	------	6	5	2	7	16	7	5	5	7	------
	Salary bracket											
$2,500–$2,999	2	------	------	1	------	------	1	------	------	------	------	------
$3,000–$3,499	24	2	(1)	(1)	1	3	6	1	1	4	5	1
$3,500–$3,999	47	3	------	------	3	4	8	9	4	6	5	5
$4,000–$4,499	32	19	------	------	1	3	3	------	2	1	3	------
$4,500–$4,999	5	------	------	------	1	------	------	2	2	------	------	------
$5,000–$5,499	7	------	5	------	------	1	------	1	------	------	------	------
$5,500–$5,999	7	------	------	------	------	------	------	3	2	1	------	1
$6,000–$6,499	1	------	------	------	------	------	------	1	------	------	------	------
$6,500–$6,999	1	------	------	------	------	------	------	1	------	------	------	------
$7,000–$7,499	2	------	------	------	------	1	------	------	1	------	------	------
$7,500–$7,999	1	------	------	------	------	------	1	------	------	------	------	------
$8,000–$8,499	1	------	1	------	------	------	------	------	------	------	------	------
Not stated [1]	34	------	16	18	------	------	------	------	------	------	------	------

[1] Information from private industry on salaries was incomplete.

lands is lower than in the mainland areas studied. That 14 Maryland sanitarians without a degree (table 5) are in a higher salary bracket than 20 holders of a degree is usually because the college graduates have been at work a shorter time.

Service and Training

Tables 7 and 8 deal with length of service with the present employer. In this field, as a rule, the length of service is identical with the years in sanitation; very few sanitarians have had previous experience in sanitation before coming to the present job.

The information in these two tables gives us some idea of turnover. It appears that one-third of the sanitarians in Maryland counties and one-fourth of those in the other areas have served their present employers less than 3 years. We can also see that the period of service in Baltimore City varies also according to the activity—plumbing inspection has been long established in the health department, whereas housing is new. We can interpret the tables as pointing a need and opportunity for early training in order to make the workers effective as soon as possible and to prevent undesirable work habits from forming and becoming fixed.

The most detailed account of on-the-job training is available in Puerto Rico's replies to the questionnaire. Almost one-third of the sanitarian staff attends one or more short courses each year. Twenty-two sanitarians took 1-day short courses in 1951; altogether, 31 took short courses that year. Forty-two sanitarians took short courses in 1952, and 74 in 1953. Several persons attended from 3 to 6 institutes each in the years 1951 to 1953. The health department usually arranges the programs for these short courses, sometimes with outside help.

For years, a feature of training sanitarians in Puerto Rico has been a general sanitation course lasting some 90 days. A similar course is offered in many States. The training in Puerto Rico was intended for the nonsupervisory personnel but was not taken by the workers in vector control, a group of older men, or by those studying for a master's degree in sanitary science at the University of Puerto Rico. Of the 201 general sanitarians, 143 (71 percent) took the 90-day course in the years from 1937 to 1954—a remarkably good record for this 17-year period. The ages of the 58 who have not taken such a course vary as follows:

Age group	*Number*	*Age group*	*Number*
25–29	5	50–54	7
30–34	7	55–59	13
35–39	3	60–64	12
40–44	4	65–69	3
45–49	4		

The health department might well consider which of these individuals could profitably take the 3 months' general course.

Table 7. Length of sanitation service with present employer, for sanitarians in Baltimore, 1954

Years of service	Total	Sanitary police	Private industry sanitarians		City health department sanitarians							
			Foods	Milk plants	Industrial hygiene	Foods	Housing	Meats	Milk	Rodent control	General sanitation	Plumbing
Total number of sanitarians	164	24	22	19	6	12	19	18	12	12	13	7
Less than 3	41	7	5	4	2	3	12	2	1	1	4	
3–4	18	3	1	3	1	1	3	1		4	1	
5–9	48	11	8	3	1	5	4	2	2	6	4	2
10–14	20	1	3	3	1	2		2	3	1	4	
15–19	5	1		2				2				
20–24	7			4				1	1			1
25–34	18		1		1	1		8	5			2
35 or more	2											2
Not stated	5	1	4									

Table 8. Length of service with present employer, for sanitarians in Maryland, Puerto Rico, Virgin Islands, 1954

Years of service	Total	Maryland			Virgin Islands	Puerto Rico		
		State	County	Private industry [1]		Supervisors [2]	Insect control sanitarians	General sanitarians
Total number of sanitarians	327	5	68	11	10	22	10	201
Less than 3	93	1	23	3	3	10		53
3–4	36		16		1	4		15
5–9	92	2	11	4	2	7	3	63
10–14	38	2	14	2	1	1	2	16
15–19	20		4				1	15
20–24	14			1			1	12
25–34	25						3	22
35 or more								
Not stated	9			1	3			5

[1] Milk plant sanitarians. [2] With degree of master of sanitary science.

Uses for a Sanitarian Study

For some 14 years the public health nurses concerned with staff preparation have used a questionnaire on college education and formal training in public health nursing to point out problems, to plan programs, and to measure progress from year to year.

We offer this analysis of a pilot study in an effort to spur a similar evaluation for sanitarians. All concerned—sanitarians, sanitary engineers, training officers, and health officers—need to discuss the subject and move toward some agreement on standards..

That an inventory of sanitarians is seriously needed is evident. It is important to know much more than we do about our sanitarians, who they are, where they are, whether they are employed by the community or privately. They will all be needed in a public emergency.

Some such inventory procedure would seem indispensable for any administrator responsible for the services of a group of sanitarians. Whether a questionnaire, as used in this study or after some revision, should be used or whether a personnel card containing similar data would suffice is a fair subject for consideration. The questionnaire used in this study frequently aroused staff interest, a desirable reaction. It seems evident that the information should be collected in every State and in such a uniform fashion as to permit comparison.

• • •

Samples of the questionnaire on sanitarian training are available from Region III, Public Health Service, Department of Health, Education, and Welfare, Washington 25, D. C.

Ratio of Old-Age Assistance to Old-Age Insurance

Proportionately, 20 percent fewer people were receiving old-age assistance payments in June 1955 than in June 1950, Commissioner of Social Security Charles I. Schottland reported in November.

There were 14,244,500 persons aged 65 or older in June 1955. Old-age assistance was received by 2,544,496, or 179 of each 1,000. In June 1950, 2,786,690 of the aged population of 12,399,100, or 225 of each 1,000, were receiving old-age assistance.

One reason for this decline in the number of assistance recipients is the increase in the number of aged who now receive old-age and survivors insurance benefits. In June 1950, only 169 of each 1,000 aged persons received insurance benefits. In June 1955, 423 of each 1,000 aged received insurance benefits.

Although the caseload of aged persons drawing public assistance has dropped during the past 5 years, the cost of the program has increased because payments to individuals in most States are larger.

The control of leptospires in animal host carriers may hold a key to breaking the chain of infection that perpetuates leptospirosis in man.

Canine Leptospirosis and Public Health

By ROBERT J. BYRNE, D.V.M.

SINCE the first report of canine leptospirosis in the United States in 1937 (*1*), the disease has been found with increasing frequency. Today, the effective detection and treatment of canine leptospirosis must be regarded as one of the most important problems challenging the veterinary profession.

Leptospira canicola, the organism responsible for the canine disease, can be transmitted to man by various methods. The resultant illness is a serious one and should be considered as a public health problem of importance. The various aspects of *Lept. canicola* infections necessary to an understanding of the problem will be considered here.

History

The first detailed description of the disease now believed to be human leptospirosis dates back to 1886 when Weil described the clinical disease syndrome which still bears his name. The disease was characterized by icterus, fever, hemorrhagic tendency, and a high mortality resulting from renal, hepatic, and vascular failure.

The search for the etiological agent of this so-called "Weil's disease" ended when Japanese (*2*) and European (*3*) workers independently isolated a spirochete, later designated as a *Leptospira* by Noguchi (*4*).

The first evidence of an animal-host carrier was obtained by Miyajima in Japan, who demonstrated that spirochetes were present in the tissues of field mice (*5*). The significance of such leptospiral carriers was dramatically illustrated in the rat infested trenches of World War I where over a hundred cases of human leptospirosis occurred (*6*). Since those early reports, new leptospiral hosts have been found, including almost every type of domestic animal, most rodents, and many wild animals. In addition to *Leptospira icterohemorrhagiae*, numerous other leptospiral serotypes pathogenic for animals and man have been identified and differentiated from each other by serologic techniques.

In 1931, Klarenbeek and Schuffner, in the Netherlands, isolated leptospires from the urine of a dog affected with nephritis (*7*). The leptospiral strain was found to differ, serologically, from *Lept. icterohemorrhagiae* and was designated as *Lept. canicola*. Shortly thereafter the first human infection with *Lept. canicola* was reported in that country (*8*). This leptospiral serotype was isolated from dogs in the United States by Meyer and associates in 1937 (*9*), and the first human case in this country was reported in 1938 (*10*).

Etiology

Members of the genus *Leptospira* are delicate filamentous organisms, tightly coiled, and usu-

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ally hooked at both ends. They are generally 6 to 14 microns in length, but individual organisms measuring up to 40 microns have been observed in laboratory cultures. They are difficult to stain and cannot be observed in the living state except by darkfield or phase-contrast microscopy. These spirochetes can be propagated in special laboratory media in which they may remain viable for a year or longer. Viability, as well as pathogenicity for certain animal hosts, may be maintained by serial passage in hamsters of infective blood or tissues. Since one leptospiral species cannot be differentiated from another by morphologic, cultural, or biochemical methods, classification is based on serologic methods involving cross-agglutination and absorption techniques.

Epidemiology

The widespread distribution of canine leptospirosis in the United States has been substantiated by numerous epidemiological surveys. The reported incidence has varied from 3 to 38 percent depending on the diagnostic technique used and the age of the dogs surveyed (*11–13*). Man and other susceptible hosts can become infected by direct contact with contaminated urine from infected dogs, by consumption of food or water so contaminated, or by close contact with surface water in which pathogenic leptospires are present. Infection can occur by entry of these organisms through a skin abrasion or cut, or through the unbroken mucosal surfaces of the conjunctiva, pharynx, or nasal passages.

Pathogenic leptospires are harbored in the kidneys of rodents and other mammalian hosts. These organisms display a characteristic affinity for the renal cortex where they may be found nesting in the lumina of the convoluted tubules. From these foci they may be excreted in the urine for long periods of time. Should such organisms find their way into a favorable environment—such as damp soil or a small body of fresh water—they may survive for as long as 22 days (*14*). Dr. D. W. Johnson of Australia in a personal communication reports survival of the organisms for as long as 7 weeks.

The possibility of transmitting this disease from dog to man is readily apparent. Dog handlers, kennelmen, and veterinarians are most subject to infection from exposure to contaminated urine. Cuts, abrasions, or scratches of the hands provide suitable routes of entry for these organisms. The fact that in many instances a dog's urine may be acidic is no assurance that infections cannot be acquired in this manner. Despite the preference of leptospires for an environment having pH values ranging from 6.8 to 8.6, these organisms are able to survive for short intervals in acidic urine, and upon invading a new susceptible host could multiply and produce disease.

Human *Lept. canicola* infections associated with swimming or wading in surface waters contaminated with dog urine have been reported (*15*). Of possibly greater epidemiological significance is the transmission of *Lept. canicola* infections from dogs to larger domestic animals and subsequent development of leptospiruria in these new hosts. The relatively large volume of infected urine excreted by these animals, cows and swine, for example, poses a far greater threat in the contamination of surface water than that excreted from dogs (*16*).

A constant reservoir of infection is maintained in the kidneys of the many urinary shedders among the canine population. This factor, coupled with the characteristic greeting behavior of dogs, insures the sustenance of *Lept. canicola*. Presumably, *Lept. icterohemorrhagiae* infections in dogs are contracted in this manner or when dogs kill and eat infected rats or other rodents.

The dog has been proved a host to several distinct leptospiral strains, some of which have yet to be reported in the United States. *Lept. canicola* has been universally incriminated as the most frequent leptospiral parasite of dogs, although occasional cases of *Lept. icterohemorrhagiae* infections have been reported. In the United States, serologic evidence indicates that about 90 percent of all canine leptospirosis involves *Lept. canicola* and 10 percent are probably due to *Lept. icterohemorrhagiae* (*17*).

Other leptospiral strains which have been reported in dogs are *Lept. pomona*, the principal causative agent of bovine and porcine leptospirosis in the United States; *Lept. hebdomadis* and *Lept. autumnalis*, the latter two serotypes being found most frequently throughout the Far

East. *Lept. australis* A, *Lept. medanesis*, *Lept. bataviae*, *Lept. grippotyphosa*, and *Lept. sejroe* have all either been isolated from dogs or there is serologic evidence suggesting their existence in this host. The importation of dogs from many parts of the world carries with it the possibility that new leptospiral strains may be introduced in the United States, thus presenting new disease problems among both animals and man.

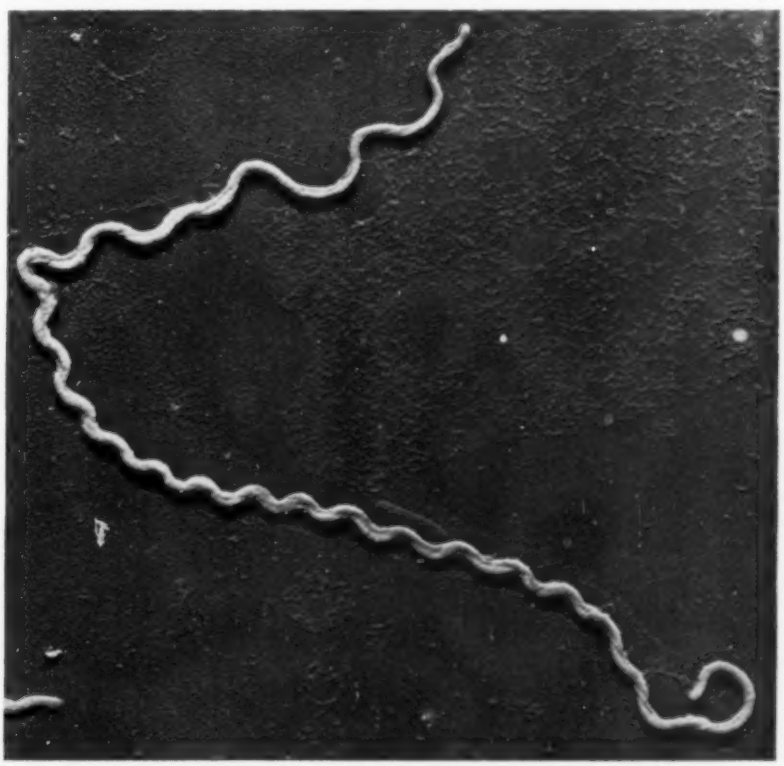
Clinical Aspects in Animals

Added to the other pathogenically unique effects which characterize leptospirosis are the particular syndromata produced by this disease in dogs. Based on experimental evidence and field observations, it is impossible to predict consistently the precise clinical response to leptospiral infection. Reactions following inoculations with living leptospires are variable—a dog may remain completely asymptomatic, or become jaundiced, develop a renal syndrome, or suffer a peracute fulminating disease resulting in death.

Acute canine leptospirosis resulting in either a severe icteric or hemorrhagic disease has been reported in epizootic proportions (*9*). The disease may appear in kennels and result in a high fatality rate, particularly among young dogs. These outbreaks are characterized by the high incidence of jaundice in affected animals from which the common designation, "canine yellows," has been derived.

An animal surviving the acute disease or experiencing a mild subclinical infection almost invariably becomes a urinary carrier. The apparent effect of the extended nesting of leptospires in the kidney tubules of dogs is a tissue response manifested finally by the development of interstitial nephritis. Should this process continue over a prolonged period of time, severe renal dysfunction may result with the development of a uremic syndrome known as "canine typhus" or "Stuttgart disease."

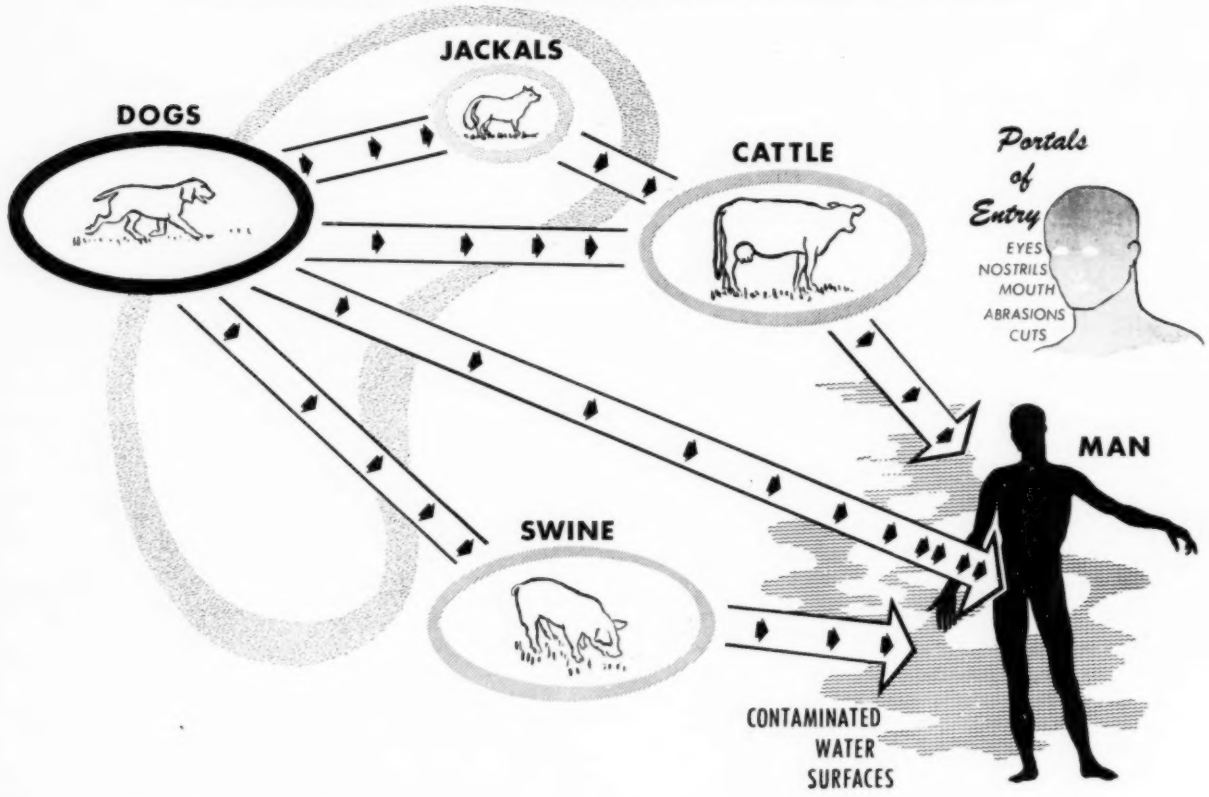
Numerous attempts have been made to outline the symptomatology of canine leptospirosis and to define and describe various forms in which the disease may manifest itself. These descriptions usually include a hemorrhagic type and a uremic type. Bloom (*18*) comments: "The clincial manifestations of canine leptospirosis are extremely variable and may be absent, latent, subclinical, atypical, mild or



Leptospira canicola magnified about 27,000X.

Photograph by Dr. Edgar Ribi, PHS, Rocky Mountain Laboratory, Hamilton, Mont.

Transmission of canine leptospirosis to animals and man.



severe. The clinically obvious disease may be peracute, acute, subacute, or chronic."

It would be equally accurate to describe the clinical disease from the bacteriological and pathological standpoint. This has been done by Stuart (*19*), who mentions three stages:

Invasive. After gaining entry, the leptospires multiply and find their way to all organs of the body. Direct isolations from the blood may be made at this time. This is the period of febrile illness and is generally accompanied by lethargy and anorexia. Jaundice, if it occurs at all, usually appears immediately at the end of this period. Serum titers do not usually reach significant levels at this stage.

Primary renal. The invasive stage may be followed a week later by a primary nephritic stage, which may be the first stage to be clinically detected. During this period leptospires have found their way to the kidney tubules, whereupon the spirochetes may be isolated from the urine. A diffuse or focal round-cell infiltration characterizes the interstitial nephritis that results from the kidney infection. The uremia which commonly occurs from this stage may result from nephron obstruction or other pathological changes, not clearly understood. Apathy, stomatitis, and thirst are the chief clinical symptoms manifested by affected animals. The blood-urea nitrogen level is generally elevated, and the leptospiral agglutination titers of the serum reach a high level.

Secondary renal. The primary nephritis stage may proceed, after a lapse of several months or years, into a secondary nephritic stage. This stage is characterized pathologically by chronic interstitial nephritis accompanied by fibrosis and clinically by uremia. Leptospiruria is rarely found, and it must be concluded that the kidney damage is not associated with a continuing infection. The serum agglutination titers tend to be of a low order during this stage.

Clinical Aspects in Humans

The basis for naming the human leptospiral diseases has included such considerations as geo-

graphic location or epidemiological and clinical similarities associated with infections by specific leptospiral strains or serotypes. For example, Weil's disease is associated with *Lept. icterohemorrhagiae* infections, and *Lept. grippotyphosa* is the etiological agent of mud fever. In Japan, akiyami, or autumn sickness, is caused by *Lept. autumnalis*. *Lept. canicola* infections in man have been described as canicola fever. Within some of these groupings extreme variations in the clinical manifestations are frequently found. The protean nature of the human leptospires is exemplified by the various symptoms of *Lept. canicola* infections.

As with other leptospiral infections, the onset of canicola fever is quite sudden and characterized by chills and fever, severe headache, stiff neck, and intense muscular pains.

In general, it is a relatively mild disease, but on occasions it may simulate classical Weil's disease and result in death. A grippe-like form of canicola fever has been described in which such respiratory symptoms as cough and bronchitis are observed. Ocular manifestations in the form of uveitis may occur long after the febrile stage of this disease has passed (*20*).

The ease with which leptospiral infections can mimic other diseases was demonstrated in an outbreak affecting 25 children in Georgia (*16*). These children went swimming in a small stream which was polluted with the urine of cows and pigs upstream and developed a disease initially diagnosed as dengue. It was not until the epidemiological and laboratory aspects of the outbreak were completed that *Lept. canicola* was established as the etiological agent.

Rosenberg (*21*), in his review article, states that approximately 50 percent of all cases of canicola fever are accompanied by meningeal symptoms. A study by Beeson and Hankey (*22*) indicated that 8 to 10 percent of all cases of aseptic meningitis are leptospiral in origin, and half of that number were canicola infections. This figure agrees closely with data obtained by other American and European investigators. Reference has been made to the resemblance of leptospiral meningitis to early poliomyelitis (*23*). Woodward (*24*) points out that leptospirosis must be considered in the differential diagnosis in any disease in which lymphocytes are found in the spinal fluid—such as lymphocytic choriomeningitis, mumps, herpes, poliomyelitis, Coxsackie disease and the various neurotropic encephalitides.

Laboratory Diagnosis

The reported incidence of leptospirosis often varies with the awareness of the disease. To confirm a diagnosis of leptospirosis in either man or animals, adequate laboratory support is essential. At present, this type of support is not always available. There are relatively few laboratories in the United States which have the necessary equipment and trained personnel essential to carry out this task. The laboratory diagnosis of leptospirosis is based either on the demonstration of the organism in the blood, cerebrospinal fluid, or urine during the course of disease, or by a rise in antibody titer between serum specimens taken during acute and convalescent phases, or by pathological findings at autopsy.

Leptospires appear regularly in the circulating blood during the first week of disease and may be isolated at this time by directly inoculating a few drops of blood into appropriate laboratory media. These cultures are subsequently examined at 2-week intervals by darkfield microscopy. If no leptospires can be demonstrated in the media after 28 days, cultures may be discarded as negative. Such techniques may also be employed in isolating leptospires from cerebrospinal fluid during the early stages of infection. It is difficult and often dangerous to base a diagnosis of leptospirosis on the direct darkfield examination of blood. The presence of artifacts in the form of fibrin shreds or other blood constituents may lead to a false diagnosis. Conversely, leptospires are ordinarily present in such small numbers as to be missed by direct examination.

The leptospiruric phase of the disease usually commences about 12 to 14 days after the onset of symptoms. The same precautions must be applied to the direct darkfield examination of urine as were cited regarding blood, although on occasions, large numbers of leptospires have been directly observed in the urine of dogs and other animals.

Attempts to isolate these spirochetes from urine are best made by inoculating freshly

voided or catheterized urine samples intraperitoneally into young guinea pigs or hamsters, bleeding these animals by cardiac puncture 4 to 6 days after inoculation and culturing media with their blood. These cultures are then handled in the same manner as those initiated directly from the patient's blood. Cultivation of leptospires directly from urine is usually not feasible, because of bacterial contaminants.

Serologic diagnosis is based on the demonstration of a rise in antibody titer between serum specimens drawn during the acute phase of disease and during convalescence. In the laboratory at the Army Medical Service Graduate School, a modification of the Schuffner-Mochtar agglutination-lysis test employing a battery of viable leptospiral type strains is used (*25*). In making a serologic diagnosis of leptospirosis, the value of paired serum specimens cannot be stressed too strongly. Single serum specimens, particularly those with a low antibody titer, are often of little value unless accompanied by a complete clinical history. A low serum titer may indicate a past leptospiral infection or a new infection in the early stage of antibody development.

Complement fixation has been employed in the diagnosis of human leptospirosis infection (*26*). Although it has proved of value in the diagnosis of leptospirosis per se, it is not sufficiently specific to give any clue as to the infecting strain or serotype. To date at our laboratory, this test has been of little value in the diagnosis of canine leptospirosis due to the occurrence of nonspecific reactions between antigens and the majority of canine serums.

The use of various types of macroscopic agglutination antigens in the serologic diagnosis of leptospirosis has been cited on numerous occasions. Although tests employing such antigens have had advantages in the ease and rapidity of performance, they are generally less sensitive than microscopic tests, and often the antigens have been found to be unstable. Recently a capillary-tube test for the diagnosis of leptospirosis was described by Stoenner (*27*).

Therapy

An effective course of treating human leptospirosis still remains a conspicuously unsolved problem. Hall and associates (*28*), in a study of 67 laboratory confirmed cases, concluded that none of the antibiotics employed in their study altered the course of disease or affected the duration of leptospiremia. Other workers (*29*) obtained similar results in dogs, hamsters, and guinea pigs when evaluating chloramphenicol, subtilin, and penicillin G. Gsell (*30*), however, reports favorable response in human leptospirosis to either aureomycin or terramycin if initiated on the first or second day of disease. Brunner and Meyer have reported that streptomycin (*31*) or aureomycin (*32*) given in adequate dosage will eliminate the carrier state in dogs and hamsters. These investigators suggest the administration of either of these antibiotics to dogs whenever there is a question of an animal being a carrier and transmitting the disease to other animals or man.

Control

The ultimate control of human canicola fever is based on the control of the animal leptospiroses. To achieve this end and to break the chain of infection that perpetuates the disease, it is essential that a vaccine for the prevention of canine leptospirosis be developed and made available for widespread distribution and use. Such a vaccine, of necessity, should meet the following requirements:

1. Elicit the production in the recipient of protective antibodies which will persist over a reasonable period of time, while at the same time insure that the vaccinated animals will not develop either clinical symptoms or leptospiruria subsequent to challenge. Bacteriological studies on both vaccinated animals and controls must be carried out to determine the degree of protection attained.

2. Exhibit minimal toxicity following administration.

3. Be polyvalent and give adequate protection against both *Lept. icterohemorrhagiae* and *Lept. canicola* in the United States. In certain other countries, additional leptospiral strains would have to be incorporated in such a vaccine.

Until canine leptospirosis is controlled, a large reservoir of infection remains among the dog population. The owners of these animals must be educated to this fact and to the danger

of acquiring canicola fever from close association with dogs.

Conclusions

Canine leptospirosis is widespread, and its control is a growing problem to the veterinary profession. Certain fundamental questions regarding epidemiological, clinical, pathological, and immunological characteristics of canine leptospirosis remain unanswered. Practicing veterinarians can do much to alleviate this situation by recording and reporting clinical cases of canine leptospirosis, particularly in those instances in which laboratory support has been made available.

Research activities must be directed toward the development of improved diagnostic techniques, further evaluation of therapeutic agents in the treatment of clinical leptospirosis, and development of adequate vaccines for the protection of man and animals.

The extent of human leptospirosis acquired from dogs remains undetermined. Education of the public to the danger of acquiring the disease, the development of adequate diagnostic laboratory facilities, and a constant awareness of the protean nature of the disease are the best means of bringing the problem into proper perspective.

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Warning on Salicylate Drug Labels

The Food and Drug Administration has asked drug manufacturers to label aspirin and other salicylate drugs with a warning to keep these products out of reach of children.

Accidental misuse of salicylate preparations prompted the new ruling. Although salicylates ordinarily are not toxic in amounts required for producing analgesic action, they can cause injury or death when taken in excessive quantities. Poisoning by salicylate preparations are responsible for about 100 deaths a year, mainly in children under 5 years of age.

Recommended statements on the labels are: "Warning—Keep out of reach of children" or "Warning—Keep this and all medications out of the reach of children."

In lieu of specific dose recommendations for children under 3 years of age, FDA recommends the statement: "For children under 3 years of age, consult your physician."

The ruling does not apply to oil of wintergreen (methyl salicylate), which already bears a warning statement; effervescent salicylate preparations (those that "fizz" when placed in water); or preparations of para-aminosalicylic acid and its salts, which are used only in the treatment of tuberculosis.

The advisory ruling, published in the *Federal Register* on October 15, 1955, is based on the recommendation of the FDA medical advisory panel consisting of pediatric experts and drug industry representatives. Six months are allowed for modifying present labeling.

Location of Dentists in Relation to Dental School Attended

By WALTER J. PELTON, D.D.S., M.S.P.H., ELLIOTT H. PENNELL, B.S., and MARYLAND Y. PENNELL, M.Sc.Hyg.

DENTISTS in the United States tend to establish their practice within the area where they received their training. Data from the 1953 American Dental Directory (*1*) have been used to analyze the relationship between each dentist's location in 1952 and the location of the dental school in which he received his training. The directory listing usually identifies the city or town where the dentist is located, the year he was graduated, and the name of the dental school under the title which applied at the time he was in attendance.

In mid-1952 there were 84,214 dentists located in the 48 States and the District of Columbia, excluding the 7,423 dentists in the Federal services. As would be expected, most of the dentists were trained in schools located within the continental United States. A total of 78,025 dentists were graduates of active or formerly active schools located in 25 States and the District of Columbia; 490 were graduated from foreign dental schools, and 5,699 were listed in the directory without specifying the dental school from which they received their degree.

Each geographic division of the country draws the majority of its dentists from graduates of schools located within its borders, with the exception of the Mountain States (table 1).

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The most striking examples of this pattern are represented by the East and West North Central groups of States where nearly 9 out of 10 of the dentists attended school in the geographic division in which they were located in 1952 (fig. 1). In four other divisions—Middle Atlantic, South Atlantic, East South Central, and West South Central—where the proportion of dentists trained within the area was not quite so high, the rest of the dentists were drawn from schools located in one or another of the adjoining geographic divisions.

A wider spread, however, is found in two other divisions. In New England, for example, where 56 percent of the dentists were trained locally, 18 percent had attended a dental school in one of the South Atlantic States, and 16 percent came from a school in the Middle Atlantic area. While 76 percent of the dentists in the Pacific area were trained there, the others were mainly drawn from schools in the North Central States.

The pattern for the Mountain States is exceptional because they have lacked dental training facilities for the past 20 years or more. Only 18 percent of the dentists in this area were trained locally; another 18 percent came from States in the Pacific division. Approximately 32 and 25 percent, respectively, were drawn from schools in the West and East North Central States.

Dentists Trained Within State

Missouri and Pennsylvania each had more than 90 percent of their dentists trained within

their borders. In 13 other States and the District of Columbia, three-fourths or more of the non-Federal dentists received their training in the State where they were located in 1952. In 6 additional States, local schools supplied between one-half and three-fourths of all the dentists, while in 4 other States the proportion varied from 1 to 46 percent. None of the dentists practicing in the remaining 23 States were graduates of dental schools within the State. More detailed information on where the dentists practicing in each State received their training and the reverse of the picture—the location in 1952 of the dentists trained in each of the 26 States with dental schools—is given in the Health Manpower Source Book series (*2*).

In New England, Massachusetts is the only State with a dental school. More than half of the dentists in Maine and New Hampshire as well as three-fourths of those in Massachusetts were trained in the latter State. Vermont, Rhode Island, and Connecticut were less dependent upon the Massachusetts schools; they also drew sizable proportions of their dentist manpower from the training facilities in Maryland and Pennsylvania.

The Middle Atlantic division has 6 active dental schools, 3 each in New York and Pennsylvania. A former dental school in New Jersey has been closed for 30 years. Two-thirds or more of the dentists in New York and Pennsylvania were supplied from the schools within their respective boundaries. Almost the same proportion of the New Jersey dentists received their training in these same two States.

All 5 East North Central States have active dental schools. For Ohio, active dental schools at Ohio State and Western Reserve Universities and schools which are now extinct have trained more than three-fourths of the dentists located in that State. In like manner, Indiana University is the principal source of the Indiana dentists. Loyola, Northwestern, and the University of Illinois trained 81 percent of the Illinois dentists; Detroit and Michigan Universities were the source of 77 percent of the Michigan dentists; and Marquette University supplied 74 percent of the Wisconsin dentists.

Active dental schools in 4 of the 7 West North Central States supplied from 78 to 91 percent of the dentists in their respective States—Minnesota, Iowa, Missouri, and Nebraska. North Dakota drew its dentists largely from schools in Minnesota and Illinois in the East North Central division; South Dakota's dentists came mainly from schools in Nebraska and Illinois. Missouri schools trained 83 percent of the dentists in Kansas.

In the South Atlantic division, Maryland, Virginia, Georgia, and the District of Columbia have dental schools that graduated a class in 1952. These schools supplied from 62 to 86 percent of the dentists in their respective States, as well as the majority of the dentists in North and South Carolina. (The University of North Carolina graduated its first class in 1954, and hence is not included in this study.) Delaware drew nearly two-thirds of its dentists from schools in Pennsylvania. West Virginia had almost equal numbers from dental schools in Maryland, Ohio, and Pennsylvania. Florida had one-third of its dentists from Georgia, with sizable numbers of graduates from schools in Illinois, Pennsylvania, and Tennessee.

In the East South Central area, both Kentucky and Tennessee had 78 percent of their dentists graduated from schools in their own States. Alabama, with a school that graduated its first class in 1952, drew about two-thirds of its dentists from dental schools in Georgia and Tennessee. Mississippi depends upon

Table 1. Non-Federal dentists located in 1952 in the same geographic division in which they attended dental school

Geographic division	Non-Federal dentists in area		
	Total number	Trained in dental school in same area	
		Number	Percent
United States	78, 025	59, 757	77
New England	5, 485	3, 073	56
Middle Atlantic	20, 922	17, 174	82
East North Central	17, 296	15, 251	88
West North Central	8, 442	7, 352	87
South Atlantic	6, 686	4, 840	72
East South Central	3, 127	2, 052	66
West South Central	4, 481	2, 494	56
Mountain	2, 279	408	18
Pacific	9, 307	7, 113	76

Figure 1. Dentists in the nine geographic divisions who were graduated from a dental school in that same division.

schools in these same two States to supply its dentist manpower.

The West South Central States have active dental schools in Louisiana and Texas that supplied 73 and 67 percent of their dentists, respectively. Oklahoma is largely dependent on graduates from dental schools in Missouri; Arkansas mainly depends on schools in Missouri and Tennessee.

The Mountain States have no currently active school, although nearly half of the dentists in Colorado were trained at the Denver schools closed many years ago. The Illinois schools led in supplying the largest number of dental school graduates to Montana and Utah. Missouri graduates ranked first in Wyoming and New Mexico; California graduates, in Arizona and Nevada.

All Pacific States now have active dental schools, since the University of Washington graduated its first class in 1950. The three California schools trained three-fourths of the local dentists. The University of Oregon, in addition to supplying its own State, furnished more than half of the dentists in neighboring Washington.

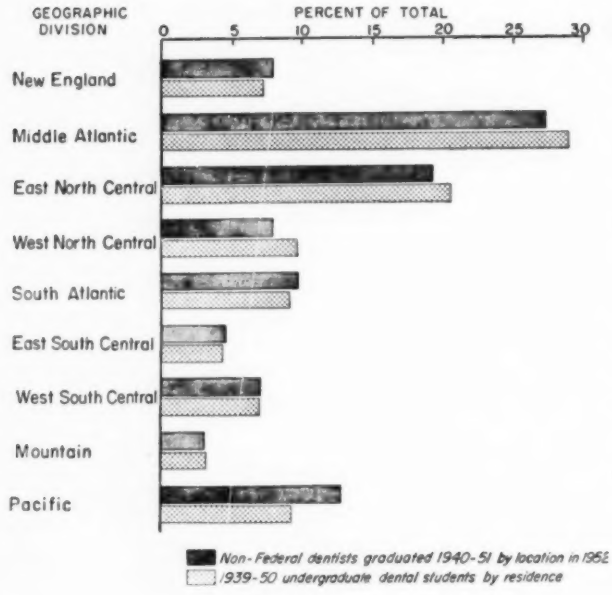
Residence of Dental Students

It has been shown that 1 out of 4 dentists listed in the 1953 directory received his professional training at a dental school located outside of the geographic area in which he later established his practice. Doubtless many of these dentists left their home State to attend dental school with the intention of returning home to set up practice. While data are not available for direct comparisons that would reveal the extent of this return, some deductions can be drawn from the distribution of undergraduate dental students published annually in the Dental Students' Register (*3*).

The proportion of undergraduate dental students in each geographic area is closely related to the proportion of graduates who subsequently established dental practice within the

same geographic area. In figure 2 the distribution by location in 1952 of the non-Federal dentists who were graduated in recent years (1940–51) is contrasted with the distribution by residence of students attending dental school in the 12 academic years 1939–40 to 1950–51.

Figure 2. Distribution of dentists and dental students.



Among the nine geographic divisions, the Pacific States show the greatest relative difference in the length of the two bars. Nearly 1 dentist in 8 who established practice in the United States in recent years was located in 1 of these 3 States in 1952. On the other hand, only 1 in 10 students trained during the 12-year period was drawn from that area. In other words this area acquired a share of recent graduates that was more than one-third in excess of that expected on the basis of its contribution to the pool of students.

In terms of actual numbers, the Pacific States gained about 700 dentists over and above their share of students (table 2). The influx was chiefly into California. Since 1940 the population growth in the Pacific States has been so great that even this gain in dentists was insufficient to maintain the 1940 dentist-population ratio.

The migration to the west coast was largely among former residents of the Middle Atlantic

Table 2. Distribution in 1952 of dentists graduated during 1940–51 from United States dental schools and distribution of undergraduate dental students, 1939–50, according to residence at time of entering dental school

Geographic division	Non-Federal dentists graduated 1940–51 by location in 1952		1939–50 dental students according to residence		Prorated share of students	Gain or loss between number of new dentists and share of students	
	Number	Percent	Number	Percent	Number	Number	Percent
United States	[1] 19,774	100.0	[2] 24,494	100.0	[3] 19,774		
New England	1,556	7.9	1,794	7.3	1,448	+108	+7.5
Middle Atlantic	5,397	27.3	7,069	28.9	5,707	−310	−5.4
East North Central	3,820	19.3	5,042	20.6	4,070	−250	−6.1
West North Central	1,562	7.9	2,377	9.7	1,919	−357	−18.6
South Atlantic	1,933	9.8	2,261	9.2	1,826	+107	+5.9
East South Central	911	4.6	1,103	4.5	890	+21	+2.4
West South Central	1,411	7.1	1,739	7.1	1,404	+7	+.5
Mountain	629	3.2	811	3.3	655	−26	−4.0
Pacific	2,555	12.9	2,298	9.4	1,855	+700	+37.7

[1] Excludes 6,558 graduates in the classes of 1940–51, of whom 4,787 were in the Federal service in 1952 and the remainder were located outside the United States or were dead.

[2] Total of the undergraduate students in United States dental schools in the fall of 1939, 1943, and 1947, excluding 788 students with residence outside the continental United States (*3*). This figure corresponds to the 1940–51 graduates after allowance is made for those who were not graduated. However, it may not include all students under accelerated programs—those not listed in the three issues of the Dental Students' Register.

[3] Non-Federal dentists represent 80.73 percent of the students. This rate has been applied to the number in the preceding column on the assumption that Federal dentists are drawn in the same proportion from each geographic division.

and North Central States. Each of these areas retained somewhat fewer recent graduates than might have been anticipated on the basis of the number of dental students trained during 1940–51 in these areas. Among the 15 States in these three geographic divisions only Michigan showed an excess of new dental practitioners over its share of students. In Minnesota, Iowa, North Dakota, South Dakota, and Nebraska about 1 in 4 students apparently failed to return to his home State to establish practice. New York, Pennsylvania, Illinois, and Minnesota each lost more than 100.

New England and the South Atlantic area showed a slight gain between the number of dentists who located there and their share of the students trained. About half of the States in these two divisions had gains; about half, losses. The largest gain, both percentagewise and in numbers, was in Florida, as would be expected from its tremendous population increase since 1940.

The South Central and Mountain States showed equal percentages of new dentists and of students. Thus, in these sections of the country, the degree to which new dentists have established practice closely paralleled the area's share in the pool of dental students maintained while these new dentists were being trained.

States With Dental Schools

The presence or absence of a dental school in a State does not greatly influence the relationship between the number of recent graduates choosing the State for practice and the State's share of dental students at the time these dentists were being trained. During the period from 1940 to 1952, 21 States and the District of Columbia had active dental schools. As a group these States accounted for 71.9 percent of the 1952 civilian population and 76.6 percent of all the non-Federal dentists. Located in these States in 1952 were 77.3 percent of the non-Federal dentists graduated in 1940–51. They had the same proportion (77.1 percent) of the students in dental schools during the period from 1939–40 to 1950–51. Within this group, however, California gained new dental graduates at the expense of the Middle Atlantic and North Central States.

On the other hand, the 23 States without dental schools supplied 15.9 percent of the students and in return received 15.1 percent of the recent graduates. (Excluded from this comparison are New Jersey and Colorado, whose only dental schools have been closed, and Alabama and Washington, whose training facilities were established for the first time during the period.)

This close correspondence between students trained and new dentists establishing practice, regardless of whether resources for professional training are primarily centered in within-State or in out-of-State dental schools, suggests that the majority of the dentists locating in an area are the same individuals who made up the undergraduates from that area.

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PHR

Venereal Disease Among Puerto Ricans in New York City

By JULES E. VANDOW, M.D.

FOLLOWING World War II, thousands of Puerto Ricans migrated to the continental United States seeking better economic conditions than were available to them in Puerto Rico. The greatest number of these migrants settled in New York City. About 246,000, or approximately 82 percent of all the Puerto Ricans in the continental United States and 3.1 percent of the city's total population, were located there, according to the 1950 census. As a result of further in-migration and births, these figures have increased to an estimated 500,000—6.2 percent of the total population of New York City. Estimates recently published by the department of city planning indicate that by 1970 Puerto Ricans in New York City may number 1,160,000, or about 13.5 percent of the city's population (*1, 2*). However, this estimate may have to be revised downward if the 1953 decrease in migration, resulting from increased industrialization in Puerto Rico, is maintained.

From the point of view of the division of social hygiene of the New York City Health Department, it seemed worth while to examine whatever data were available which could give information regarding the prevalence of syphilis in this large and growing group. This paper is based upon the following reports:

1. Results of the 1953 mass blood testing survey in New York City.
2. Results of blood testing in the Puerto Rican project of the division of social hygiene, New York City Department of Health.
3. A sample study of the statistics of the New York City Health Department social hygiene clinics for the last quarter of 1954.
4. The total venereal disease case reports for the city as a whole for the period January 1–December 31, 1954.

Puerto Ricans are defined as those individuals who were born in Puerto Rico or whose mothers were born there. By this definition, all persons at the Puerto Rican blood testing project of the health department were Puerto Ricans. In the mass blood testing survey, each person was asked where he was born and where his mother was born. In both studies, the race of each person was recorded as white, Negro, or "other." The term "other" refers to dark-complexioned Puerto Ricans who could not be classified as either white or Negro.

The data obtained from the records of the social hygiene clinics and from the venereal disease case reports are far less specific or accurate than data from the records of the Puerto Rican blood testing project and the mass blood testing survey, and conclusions drawn from clinic or morbidity records are of questionable accuracy. Information on the birthplace of the patient or his parents is not requested by

Dr. Vandow is chief, division of social hygiene, New York City Department of Health, New York, N. Y., and a special consultant to the Public Health Service. *This report of a study conducted with Public Health Service assistance was read as part of a symposium on selective blood testing programs at the Venereal Disease Control Seminar, Regions I and II, Department of Health, Education, and Welfare, Atlantic City, N. J., March 24, 1955.*

the social hygiene clinics or on the health department venereal disease report form, lest the erroneous impression be given that such information would have a bearing on the type of treatment received. In this connection, it cannot be stressed too strongly that at all health department installations the same treatment is given to all persons, regardless of race or national origin. Studies dealing with such mixed groups reveal information necessary for health authorities to prepare their programs.

Mass Blood Testing Survey

From May 4 through June 26, 1953, the New York City Health Department conducted a mass blood testing survey. A detailed report of the survey was presented by Dr. Samuel S. Frank at the 1954 Venereal Disease Control Seminar of the Department of Health, Education, and Welfare.

Only Puerto Ricans living in Manhattan will be considered in this report since over 60 percent of the Puerto Ricans in New York City and 89.3 percent of the Puerto Ricans tested live in the Borough of Manhattan. In the mass blood testing survey, 4,885 Puerto Rican born residents of Manhattan—3,870 white and 1,015 nonwhite—were tested for syphilis. The overall positivity rate was 9.6 percent for the 3,870 whites and 11.8 percent for the nonwhites. Using data from the 1950 census and from a study made by the research bureau of the Welfare and Health Council of New York City (*3*), it was concluded that about 6,238 Puerto Ricans over age 10 residing in three Manhattan health districts, namely, Central Harlem, East Harlem, and Riverside, had positive blood tests. Two-thirds (64.8 percent) of the Puerto Ricans in Manhattan live in these three districts. Since slightly more than 58 percent of the positive cases required antisyphilitic treatment, it was further concluded that, as of the time of the survey in 1953, about 3,600 Puerto Ricans over age 10 in these three health districts of Manhattan were in need of treatment.

No conclusions can be drawn about the 40 percent of the Puerto Ricans in New York City who lived outside of Manhattan since most of the persons tested in the survey lived in that borough. Likewise, no conclusions can be drawn for the 38,000 Puerto Ricans living in the four other health districts of Manhattan since too few persons in these health districts were tested.

Puerto Rican Project

In 1952, a selective blood testing project was set up by the New York City Health Department at the office of the migration division of the Puerto Rico Department of Labor. This office was opened in 1948 to help the new in-migrants from Puerto Rico to adjust to a new environment, and it has been extremely helpful in finding jobs, in settling the many problems which result from language difficulties, and in cooperating with all Government and private agencies to promote the general welfare of the Puerto Rican in-migrant.

With the cooperation of the migration division, a clinic was set up in the local office of the Puerto Rican Department of Labor, where several hundred Puerto Ricans gather daily.

Table 1. Results of serologic examinations for syphilis at the Puerto Rican project of the division of social hygiene, New York City Department of Health

Results of examination	1952 [1]		1953		1954	
	Number	Percent	Number	Percent	Number	Percent
Total examined	1,575	100.0	2,016	100.0	1,760	100.0
Positive	115	7.3	137	6.8	113	6.4
Previously unknown	104	6.6	124	6.2	95	5.4
Doubtful	(2)	(2)	(2)	(2)	6	.35

[1] June–December. [2] No data available.

The clinic is staffed by a Spanish-speaking clerk and a health department physician. At intervals during the morning, the clerk speaks to the group in Spanish over a public address system on general health matters and mentions the fact that a health department physician is available to provide examination and advice. Those requesting a consultation are given a physical examination. At the same time, a blood specimen is drawn and sent to the serologic laboratory. Each patient is then referred to a district health center for a chest X-ray. When a blood test is positive or doubtful, the patient is referred to the nearest health department social hygiene clinic for a repeat blood test and evaluation. Treatment is given in the clinic if it is indicated.

Table 1 summarizes the results of blood testing this group of individuals from June 1952, when the project was started, through December 1954. During this period, 5,351 individuals were tested. Of these, 365 had positive blood tests—a positivity rate of 6.8 percent. Most of the group—323, or 6.0 percent of the total tested—were new cases, not previously known to the division of social hygiene. Over 50 percent had received treatment in Puerto Rico, but the type and adequacy of therapy is not known.

Table 2 summarizes, by age group, race, and sex, 111 cases of syphilis found through the Puerto Rican project during the period July 1954–January 1955. In this table, "other" refers to those patients who cannot be classified as either white or Negro. The race determination is, of course, quite arbitrary, and undoubtedly the classifications vary greatly, depending on the judgment of the individual clerk. The number of individuals classified as "other" in this study, 38 percent of the entire group, is considerably higher than the 7.6 percent given by the Bureau of the Census.

The preponderance of males over females (81 to 30) probably reflects the fact that more males than females come to the United States from Puerto Rico and that more males than females seek employment at the migration office, so that a higher percentage of males were examined. The greatest number of cases of syphilis—63, or 56.7 percent, was found in the 20-year age period 15–34, reemphasizing the fact that syphilis is a disease of youth. Of course, it is true that the majority of Puerto Ricans who migrate to the continent are the younger people, so that most of the testing is done in this group.

As for the stage of syphilis, 111 of 910 patients examined during the period May 1954–January 1955 were diagnosed as syphilitic; 23 (20.7 percent) had early latent syphilis and 88 (79.3 percent) had late latent syphilis. No cases of primary or secondary syphilis were found.

Social Hygiene Clinics

A study was made of the total number of patients examined at the social hygiene clinics of the New York City Department of Health during the period October–December 1954 (table 3).

Altogether, 8,736 individuals were examined

Table 2. Cases of syphilis among Puerto Ricans examined in the Puerto Rican project, New York City Health Department, July 1954–January 1955, by age, sex, and race

Age group	All races			White			Nonwhite			Other		
	Total	Male	Female	Total	Male	Female	Total	Male	Female	Total	Male	Female
All ages	111	81	30	57	40	17	11	7	4	43	34	9
Under 15	13	11	2	9	7	2	1	1	----	3	3	----
15–24	34	25	9	17	11	6	3	3	----	14	11	3
25–34	29	19	10	12	7	5	4	2	2	13	10	3
35–44	15	11	4	8	6	2	2	----	2	5	5	----
45–54	16	11	5	9	7	2	1	1	----	6	3	3
55–64	2	2	----	1	1	----	----	----	----	1	1	----
65 and over	2	2	----	1	1	----	----	----	----	1	1	----

Table 3. Number and percentage of patients infected with venereal disease, in social hygiene clinics, New York City Health Department, October–December 1954

Disease	Total		White		Negro		Puerto Rican	
	Number	Percent	Number	Percent	Number	Percent	Number	Percent
Examined	8,736	100.0	2,210	100.0	5,360	100.0	1,166	100.0
Infected	3,662	41.9	641	29.0	2,570	47.9	451	38.7
Syphilis	1,181	13.5	200	9.0	721	13.4	260	22.3
Primary and secondary	64	.7	29	1.3	24	.5	11	.9
Early latent	204	2.3	31	1.4	110	2.0	63	5.4
Late and late latent	869	10.0	134	6.0	566	10.5	169	14.5
Congenital	44	.5	6	.3	21	.4	17	1.5
Gonorrhea	2,077	23.8	321	14.6	1,607	30.0	149	12.8
Other venereal disease	404	4.6	120	5.4	242	4.5	42	3.6

during this period. Of these, 2,210 were recorded as white, 5,360 as Negro, and 1,166 as Puerto Rican. The race breakdown in the latter group was not recorded. As the table indicates, 1,181, or 13.5 percent of the total number examined, had syphilis. Sixty-one percent of this group were Negroes; the remainder were divided about equally between white (17 percent) and Puerto Ricans (22 percent). In the white group, 200 (9.0 percent) had syphilis, and in the Negro group, 721 (13.4 percent). In the Puerto Rican group, 260 were found to have syphilis. This was 22.3 percent of all the Puerto Ricans examined, almost 9 percent more than was found in the Negro group, a most surprising finding. This high percentage seems to be quite out of proportion to figures obtained from most sources.

There may be several explanations for this high rate of syphilis among Puerto Ricans. First of all, our clinic population is composed of persons with a high venereal disease rate. Over 60 percent of the total number examined sought consultation as a result of either contact investigation or the actual presence of symptoms of venereal infection. It is quite clear that we are not dealing here with the casual groups examined during blood testing surveys. Therefore, it is not surprising to find higher rates of infection among those applying for treatment in our clinics.

Another explanation of the high rate of infection with syphilis in the Puerto Rican group is that there were probably more Puerto Ricans examined than is indicated by the 1,166 figure. In many instances, Puerto Ricans were not identified as such on the history charts. A sample of several hundred charts bore this out. A number of individuals with typical Puerto Rican names were recorded—quite correctly—as white or Negro, with no indication of their Puerto Rican origin. The number of such individuals in this study is not known. However, if even 500 noninfected individuals listed as white or Negro were Puerto Ricans, the syphilis rate in the Puerto Rican group would drop to about 16 percent. Suffice it to say, this 22.3 percent figure is probably too high.

Venereal Disease Case Reports

During 1954, 19,412 new cases of syphilis were reported in New York City, 6,363 in white patients, 9,726 in Negro patients, and 3,323 in "others." The exact character of the latter group is not known. Undoubtedly, many Puerto Ricans are so classified. As has already been pointed out, many Puerto Ricans may be classified as either white or Negro without any indication of their ethnic origin. It is clear, therefore, that no satisfactory conclusions can be drawn from morbidity statistics. Information from surveys is unquestionably more reliable.

Summary

1. Data on syphilis infection among Puerto Ricans in New York City taken from the 1953 mass blood testing survey, the Puerto Rican

project, the social hygiene clinics of the New York City Health Department, and the New York City venereal disease morbidity reports for 1954 are presented.

2. The percentages of syphilis infections in Puerto Ricans residing in New York City as recorded in these studies varied considerably and are as follows:

Study	*Percent infected*
Mass blood testing survey, 1953:	
White	9.6
Negro	11.8
Puerto Rican project, July	6.8
Social hygiene clinics, October–December 1954	22.3

3. Some of the possible reasons for the differences in these rates are indicated. The most important appears to be that not all Puerto Ricans are designated as such in the venereal disease case reports and on the records of the social hygiene clinics. Many are classified by race only and are not included in vital statistics for Puerto Ricans.

4. The data considered most reliable were derived from the Puerto Rican project, in which the syphilis infection rate was 6.8 percent.

REFERENCES

(*1*) New York City Department of City Planning: Population changes in New York City. New York, N. Y., The Department, 1954, 6 pp.

(*2*) Jeffe, A. J.: Puerto Rican population of New York City. New York, N. Y., Columbia University Press, 61 pp.

(*3*) New York City Welfare and Health Council: Population of Puerto Rican birth in New York City: 1950. New York, N. Y., The Council, 1952, 57 pp.

Vaccination Certificates

Complete information and proper authentication are the two requisites for validating certificates of vaccination. The former is the province of the physician; the latter that of the health officer, State or local.

The vaccinating physician can help speed up processing persons for travel abroad by using the International Certificate of Vaccination form on which to record complete immunization data and by instructing the prospective traveler to have the certificate authenticated by the health officer. This form is given with the passport application. If the person is traveling on a tourist card, he may obtain his certificate from the local health department or purchase it from the Superintendent of Documents, Government Printing Office, Washington 25, D. C., at 5 cents a copy. Most travel agencies and automobile clubs also have the certificate.

A health officer's stamp on the certificate is required by international agreement for the purpose of attesting to the fact that the immunizing physician is a practicing physician within the area. This simple expedient reduces the possibility of fraudulent certificates being used.

If the health officer does not have an official stamp or seal, the Public Health Service suggests that he have a stamp made. The stamp should include the term "health officer" and the name and address of the health department.

Enforcement of Housing Laws and Housing Rehabilitation

The rehabilitation of existing substandard housing is an important facet of the prospect for a decent home and a suitable living environment for every American family. Along with the production of new housing, the prevention of blight, and the redevelopment of slum areas, housing rehabilitation can contribute toward a healthful and safe living environment. Much has been learned in the past few years about the specific effects of municipal programs for improving substandard housing. Far more is unknown. This study was undertaken to determine the changes in housing quality relating to health, safety, and livability of dwellings, as a result of compliance with the standards in housing and related ordinances.

The quality of approximately 1,000 dwelling units and their environment in 25 adjacent blocks in a pilot area in East Baltimore was measured by the American Public Health Association Housing Appraisal Method before and after the enforcement of the Baltimore City housing code and related ordinances and regulations in that area. The "before" and "after" conditions were compared. All scores are penalty scores, which means that as the score decreases, the quality improves. As a result of this "before" and "after" comparison, the following results are apparent:

1. The average dwelling penalty score decreased from 93.75 to 60.51, or 35.5 percent.
2. The average subtotal score for facilities decreased from 51.47 to 44.56, or 13.4 percent.
3. The average subtotal score for occupancy decreased from 7.52 to 6.98, or 7.2 percent.
4. The average subtotal score for maintenance decreased from 34.76 to 8.97, or 74.2 percent.
5. The percent of owner occupancy remained at 41.5 percent.
6. The average shelter rent increased $6.40, from $36.40 to $42.80 per dwelling unit per month. The average gross rent increased $5.70, from $48.20 to $53.90 per dwelling unit per month.
7. The median family income increased from $239 per month to $259 per month.
8. The median environmental block penalty

Public Health

MONOGRAPH

No. 34

The accompanying summary covers the principal findings presented in Public Health Monograph No. 34, published concurrently with this issue of Public Health Reports. Mr. Johnson is director of the Research Institute and Construction Department, National Association of Home Builders; Mr. McCaldin is with the Division of Sanitary Engineering Services, Public Health Service.

Readers wishing the data in full may purchase copies of the monograph from the Superintendent of Documents, Government Printing Office, Washington 25, D. C. A limited number of free copies are available to official agencies and others directly concerned on specific request to the Public Inquiries Branch of the Public Health Service. Copies will be found also in the libraries of professional schools and of the major universities and in selected public libraries.

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Johnson, Ralph J., and McCaldin, Roy O.: Housing rehabilitation and enforcement of housing laws. Public Health Monograph No. 34 (Public Health Service Publication No. 451). 34 pages. Illustrated. U. S. Government Printing Office, Washington D. C., 1955. Price 30 cents.

score was 57.5. This is due primarily to penalty points assigned for "land crowding" and "nonresidential land use." The environmental survey was not repeated because it was evident that no significant changes occurred in items that would affect the environmental score. An important exception to this was the demolition of two blocks of deteriorated dwellings for the purpose of building a school. However, the dwellings in these two blocks had to be excluded from the "before" universe, since they were demolished before the time of the "after" survey.

9. The results of the examinations of rent and housing quality appear to show that, in the pilot area during the enforcement period, rent and housing quality bear little or no direct relationship to each other, either before or after enforcement of the housing code.

10. The data indicate that the enforcement effort resulted in significant improvement of the quality of housing in the pilot area, without untoward effect on the residents. As a consequence, the improved dwellings are healthier and safer places to live. Furthermore, the improvement in maintenance scores alone should insure that the useful life of these dwellings will be significantly extended.

Federal-State Rehabilitation Program

Marion B. Folsom, Secretary of Health, Education, and Welfare, has invited the "full support" of State governors for the Federal-State program of restoring disabled persons to useful lives.

Congress has increased Federal appropriations from $23,000,000 in fiscal 1954 to $27,000,000 in fiscal 1955 and $33,750,000 for 1956. Legislation passed in 1954 is designed to increase the number of disabled persons restored to employment each year from the current level of 58,000 to 200,000.

The major portion of the appropriations was designated for State programs of vocational rehabilitation and the remainder was made available for training personnel, expanding public and private nonprofit rehabilitation facilities, and for research and demonstrations of ways of dealing with disability.

The Office of Vocational Rehabilitation reports that available State funds apparently will permit the States to use all of the appropriated Federal funds during the current fiscal year. With uneven expansion and improvement in rehabilitation activities, however, some States are exceeding the required appropriations and others only partially meeting the expected goals.

Each year some 250,000 persons reach the point of disability at which they require rehabilitation services. Even if the public program can annually achieve 200,000 rehabilitations, a sizable number will continue to rely on private services for help.

Organized Home Care Programs

Sick persons have been cared for at home from time immemorial. Care usually has been limited to physicians' services and, when it has been available, to nursing care. Rarely has it included the full range of services and the special supplies and equipment so often necessary to meet the total needs of patients.

The current concept of a home care program is one in which selected patients are provided with a full range of services in their homes. These services are planned for and coordinated through one administrative agency or institution.

Comprehensive services to patients at home include:

- Physician's services
- Medical specialist consultation
- Nursing service
- Social service
- Physical therapy
- Occupational therapy
- Speech therapy
- Nutrition consultation
- Housekeeping services
- Laboratory examinations
- X-rays
- Drugs and medical supplies
- Prosthetic appliances
- Hospital and sickroom equipment
- Transportation

During the past two decades, organized home care programs have been established to make available a range of services to patients at home and to provide a field work experience in a home setting for professional personnel. Comparable information on these programs has been lacking. To meet the need for such information, the Public Health Service and the Commission on Chronic Illness undertook a joint study of 11 home care programs, selected to represent various auspices, different administrative patterns, and broad geographic distribution.

For the purposes of the study, organized home care programs were defined as those having centralized responsibility for the administration and coordination of services to patients and providing at least the minimum of medical, nursing, and social services, and essential drugs

Public Health

MONOGRAPH

No. 35

The accompanying summary covers the principal findings presented in Public Health Monograph No. 35, published concurrently with this issue of Public Health Reports. The study upon which the report is based was a joint project of the Public Health Service and the Commission on Chronic Illness.

The study was conducted and the monograph was prepared by a study staff from the Public Health Service. The director is a physician on the staff of the Division of Public Health Methods. The nursing, medical, social, and statistical consultants on the study staff were in the Chronic Disease Program, Division of Special Health Services. They have since been assigned to other units of the Public Health Service.

Readers wishing the data in full may purchase copies of the monograph from the Superintendent of Documents, Government Printing Office, Washington 25, D. C. A limited number of free copies are available to official agencies and others directly concerned on specific request to the Public Inquiries Branch of the Public Health Service. Copies will be found also in the libraries of professional schools and of major universities and in selected public libraries.

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Waterhouse, Alice M., Bailey, Eleanor C., Gillis, Mary C., and Palmer, Jeanne T.: A study of selected home care programs. Public Health Monograph No. 35 (Public Health Service Publication No. 447). 128 pages. U. S. Government Printing Office, Washington, D. C., 1955. Price 65 cents.

and supplies. Part I of the monograph summarizes the findings, presents conclusions, and suggests guidelines for the establishment of home care programs.

Programs in the study show that they range in size from an annual patient load of less than 100 up to several thousand. Patients of all ages with virtually all types and severity of illness are given care at home. Some programs serve patients with either acute or chronic illness; others provide care to patients with chronic illness only; one serves exclusively patients with tuberculosis. All of the programs make available medical, nursing, and social services; drugs and medical supplies; X-rays and laboratory tests; hospital equipment and sickroom supplies; and transportation. The availability of the other services listed above varied. In all programs, patients could be hospitalized without delay when the need arose.

Of the programs studied, the eight based in hospitals and health departments are administered by physicians. Social workers administer the two programs that are under the auspices of social agencies; and the program sponsored by a nursing agency is administered by a public health nurse.

Wide variation was found in the extent to which the central administrative agency itself provides services or assumes responsibility for arranging for services through other community agencies. In some programs, the major portion of the services are supplied by a home care staff, while in others, services are provided through community agencies, with the home care staff functioning primarily as the coordinating agent.

Indigent and medically indigent patients only are eligible for services in 10 of the programs. The one exception offers service to patients regardless of financial status through their private physicians, although patients are charged according to their ability to pay.

It was impossible to obtain comparative data on costs of the programs since the items included in the home care budgets varied greatly from one program to another. Moreover, no records were kept of the costs borne by the family or of expenditures by the community for services provided without charge.

A number of the programs are used to provide educational fieldwork experience for graduate and undergraduate medical students, professional and practical nurse students, and graduate students in social work. Teaching methods are still experimental in the home setting and show wide variation in the programs studied.

Part II of the monograph describes each program studied with regard to its origin and development, objectives, organization, administration and operation, and use of home care in professional education. It gives cost and statistical data on types of patients and services.

The appendix presents the types of information collected in the schedules used for the study.

PHR

Noise Health Hazards in the Air Force

By LT. COL. JACK C. CARMICHAEL, USAF, MSC

DURING the past 10 years the public has become concerned with the effects of noise. Noise is an unavoidable byproduct of modern power producing machinery. It is a byproduct of force, energy converted to sound. Production of power in prodigious amounts is necessary to effective military aircraft. Inevitably, such power generates noise at extremely high levels.

Industry, too, has encountered noise problems. Within the plant a noisy environment possibly affects efficiency and may damage hearing. Imperfect hearing and nervous strain also reduce the normal margin of safety. Noisy mixers, washers, or vacuum cleaners encounter sales resistance. Noisy products or operations raise acute objections in residential areas. Noise is disparaged as a nuisance, for interference with communications, for damage to hearing, and for other possible effects on health, efficiency, or safety.

The problem is indeed broad. It directly affects the daily lives of the majority. Many excellent papers have covered technical aspects of noise and its control. In this short paper, I shall not attempt to repeat more than the minimum necessary for dealing with my subject, which is only presented as an introduction to the topic.

For this purpose "noise health hazard" is defined as those aspects of noise for which the Medical Service of the United States Air Force has a responsibility. Noise is defined as any undesirable sound, a sound that interferes with a desirable activity. However, such interference has to be specified. A given sound is not equally effective in masking speech, in interfering with sleep, or in producing permanent hearing loss.

The medical service's responsibilities cover seven major areas:

Establishment of engineering criteria for noise control.
Environmental noise surveys.
Advice on control procedures.
Evaluations on effectiveness of control programs.
Personnel protective measures.
Audiometric examinations.
Education programs, both on and off the Air Force base.

The engineering aspects of the noise health hazard can best be described by a brief discussion of these responsibilities.

Establishment of Engineering Criteria

Engineering criteria for noise control are basic to any discussion of the noise problem. The establishment of a single criterion to cover all conditions is not possible. Therefore, a separate criterion must be considered for at least three areas, namely, (*a*) damage risk, (*b*) speech communication, and (*c*) residential living.

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In each area there are unknown factors which complicate the establishment of these criteria. Notwithstanding these unknowns, decisions that involve the interaction of noise and man must be made. The following criteria are based primarily on the Wright Air Development Center (WADC) Technical Report (*1*).

Establishment of Damage-Risk Criteria

Personnel exposed to noise at damage-risk levels may suffer hearing losses (*2*). Safe levels would permit personnel to work regularly 8 hours a day for years without serious probability of such damage. Factors to be considered include a wide variation in susceptibility among individuals, duration of exposure, and, especially, the noise spectrum. The damage-risk criteria utilized, it is felt, will assure safety for the majority of exposed personnel. The criteria are given as the maximum permissible noise levels in specific frequency bands. There are eight octave bands used in the frequency range 20–10,000 cycles per second. The maximum allowable sound pressure in each of these bands is shown in the accompanying chart. These values apply to exposure with no ear protection and to continuous daily exposure. An overall sound level is not adequate as a criterion because the damaging action of noise is related to the frequent distribution of the pressure and not to the overall level.

Notwithstanding this, there are overall levels which are of such intensity as to produce known effects. For example, 150 and 160 decibels, regardless of how short the exposure, will produce damage to hearing; exposure to intermittent noises of overall levels of 100 to 130 decibels may cause temporary deafness which may persist for several hours.

Criteria for Speech Communication

The ability to communicate by voice varies in requirements from essential for personnel safety to ease of conducting a personal conversation. The following extract from the WADC technical report (*1*) presents a discussion of this variation together with the limitations of a criterion.

"In many areas, efficient performance of task is often dependent upon the ability of people to talk to each other. Whether the environment is a conference room or a machine shop, noise conditions should be adjusted to permit communication suitable to the task that is to be performed. The type of communication desired may be of varying kinds, from conversation in a normal voice, at say 20 feet, to shouting danger signals at a distance of 6 inches from the listener's ear. The acceptable levels of the masking noise are dependent, therefore, upon the particular task involved and upon the degree to which speech communication is important in the performance of these tasks, or in the maintenance of adequate morale among employees. In establishing each communication criterion, account is taken of not only the level of the masking noise, but also the vocabulary to be used in the communication, the voice level, the distance from the speaker to the listener, etc. Of primary importance is the spectrum of the masking noise. The concept of the SIL (speech interference level) was originally based on data derived from experiments with continuous masking noise. If the noise is irregular or interrupted in time, the intelligibility is affected in a way in which the SIL does not predict. At the present time, there are insufficient data to delineate the limits of intensity, shape of spectrum, and time character of the noise within which the application of the SIL is valid. It is fortunate, however, that the masking noises encountered in most practical situations have a reasonably smooth spectrum and a uniform time character. In such situations, the SIL does provide a reasonably good approximation of the effectiveness of a noise in masking speech. The validity of the use of the SIL is justified by many observations in the field. With these limitations in mind, it can be concluded that the ability to communicate by voice in the presence of noise is determined essentially by four factors:

"1. The SIL of the masking noise.

"2. The voice level used by the talker.

"3. The distance from the talker's mouth to the listener's ear.

"4. The nature of the vocabulary used in communications."

Therefore, criteria for speech communications vary with the type of communications

required, established at four levels. The chart is a plot of these criteria.

On the chart, SC–75 indicates overall sound levels in the 8 bands with an index of 75 (the arithmetic mean of the levels in frequencies of 600–1200, 1200–2400, and 2400–4800). At this level, minimum speech communications require a very loud voice at 1 foot.

At SC–65, intermittent communication is possible with a raised voice at 2 feet, very loud voice at 4 feet, and shouting at 8 feet.

At SC–55, continuous communication in work areas, such as business, secretarial, or control rooms, requires a normal voice at 3 feet, raised voice at 6 feet, and a very loud voice at 12 feet.

At SC–45, a normal voice serves at 10 feet in such locations as private offices or conference rooms.

Criteria for Residential Living

The reaction of people to a noise in their home is the most difficult criterion to establish. There are many and varied factors which influence a public reaction, the proper evaluation of which requires experts. The following brief quotation from the WADC technical report serves to outline the problem involved:

"There are essentially two aspects to the analysis of the inter-reaction between an intruding noise and human being exposed to the noise. A physiologist would call these aspects stimulus and response. The stimulus function can, as a first approximation, be defined by a physical description of the noise to which the human beings are exposed. It may, however, also be necessary to describe the physical characteristics of noise to which a particular group of people have been exposed in the past, in order to evaluate the degree to which they have become adjusted to a noisy environment. The response of residents is measured through expressions of annoyance, complaints, or even through legal action. Our task is to be able to predict their response from knowledge of the stimulus function, past and present. The many factors involved in the establishment of residential criteria preclude their discussion in detail in this paper. I would like to mention a few of the considerations which must be taken into account. Experience has shown that there are at least seven large independent characteristics of a noise stimulus that control the response behavior of a community exposed to the noise, namely:

"1. *Spectrum character.* A noise spectrum that contains audible pure tone or single frequency components appears to be more annoying than a spectrum that is reasonably continuous.

"2. *Peak factor.* A noise that is reasonably continuous in time, at least over periods of a few seconds or more, is assumed to be less annoying than an impulse-type of noise.

"3. *Repetitive character.* In addition to the short-time peak factor discussed above, the repetitive factor of the intruding noise influences a neighborhood reaction to a large degree.

"4. *Level of background noise.* Residents in areas with low background level are more likely to react to intruding noise of fairly low level than those in areas in which the background noise partially masks the intruding noise.

"5. *Time of day.* Most residents agree that intruding noise is more tolerable in the daytime than during the evening.

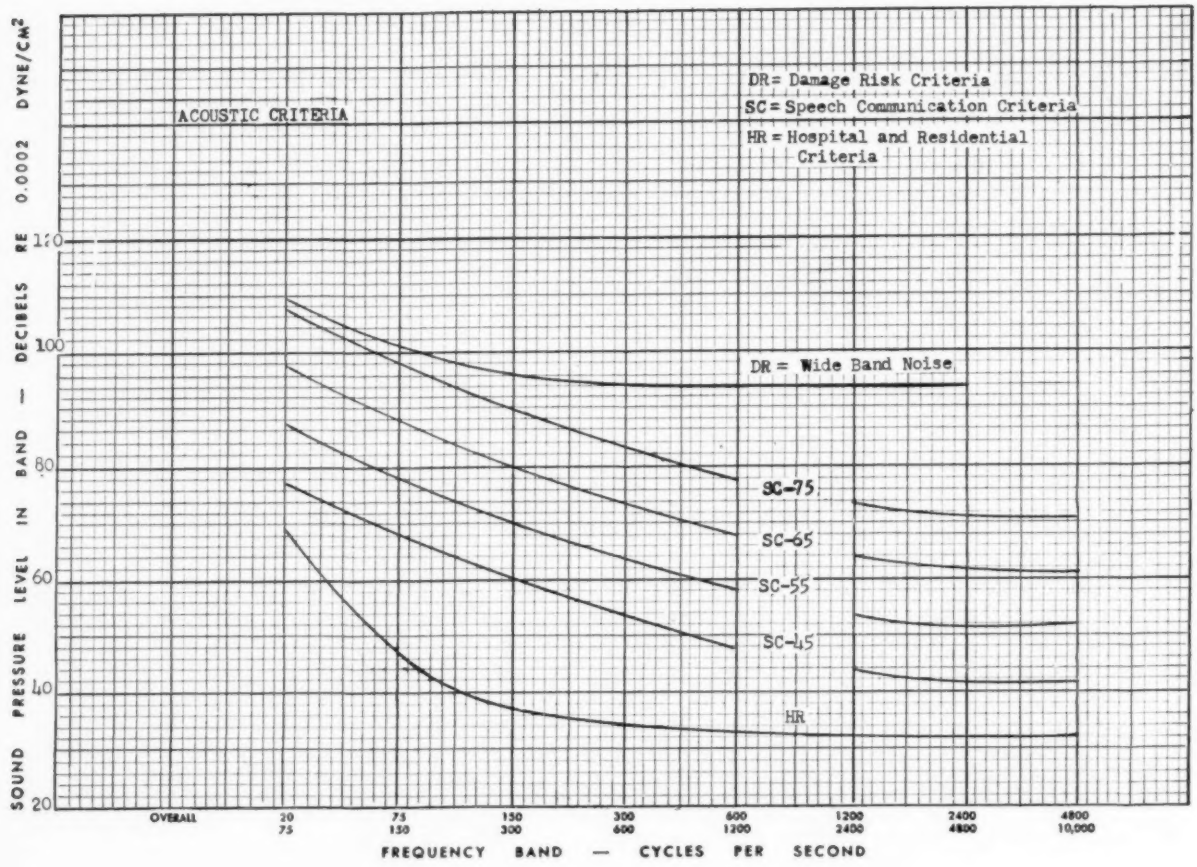
"6. *Adjustment to exposure.* Experience has shown that residents can adjust to a varying extent to an intruding noise after repeated exposures.

"7. *Other factors.* In addition to the physical factors listed above, factors of a psychological nature influence neighborhood reaction to an intruding noise, though by no means to a constant degree. Such questions as continuation of the noise and public relations between the community and those causing the noise may modify the noise rating to a marked extent."

Environmental Noise Surveys

A noise survey, in essence, is the same as any engineering survey. It requires advance planning to assure that the goal is amply stated, that adequate and properly calibrated equipment and personnel are available. The many variables in a noise survey preclude the establishment of a set procedure equally applicable to all conditions. It is imperative that the engineer planning the survey take into account the peculiarities of the particular problem. Certain guiding principles apply to all surveys.

Noise levels in frequency bands covering proposed criteria for damage risk, speech communication, and residential living.



Of particular importance are records of ambient temperature and humidity, of wind velocity and direction, of the location of facilities and time of testing, of types and serial numbers of equipment with particular reference to microphones and cables used, and, finally, of the individual observers making the measurements. General aspects of the survey are:

A description of the area to be surveyed with ample data concerning the facility. For example, a survey of an office area, hospital, or any interior should note the dimensions and type of surfaces, location and type of doors and windows, type of seal on the doors and windows, and type of use for which the facility is designed. In an area survey, the map should include all residential areas or industrial facilities.

The next major step in the survey is the location of the primary source of the noise. Descriptions of the source of noise should definitely be included with a time schedule of noise production over a 24-hour period, as well as other data pertinent to the cause of the noise or factors which might increase noise from the primary source. The location and adequate data should be provided on each secondary source of noise. The orientation of the microphones with respect to a noise source should be specified in all cases, as well as other peculiarities which affect a noise reading such as temperature of microphone, maintenance and calibration tests of equipment, and temperature and humidity of the environment on the day and at the time the readings are made.

In the selection of equipment it is well understood that microphones should be appropriate to the task. Certain microphones are designed for low sound levels, others for high sound levels. One may be designed for low frequency selectivity, another for high fre-

quency. Cables and the use of cables on the surveys call for similar discrimination. In general, where short cables are used, most microphones can be used without a corrective factor. Where a long cable is necessary, a correction will generally be required. These are but a few of the variables encountered in a noise survey.

Before an engineer attempts a survey, he should avail himself of data as a guide to selection of sound measuring equipment. Uniform practices for the measurement of aircraft noise are contained in the Aircraft Technical Committee Report No. ARTC–2 (*3*).

Advice on Corrective Action

In general the control of the source of noise is under the direction of the operator. As a consultant to the operator, the sanitary and industrial hygiene engineer submits recommendations for the correction of noise hazards. The engineer is not limited as to any particular aspect of the control program; his advice and recommendations should cover all aspects in which he is technically competent. Engineers in the Medical Service of the Air Force recommend sites for engine test cells, engine runup areas, and barracks or office buildings in relation to sources of noise. Other recommendations include soundproofing measures for buildings which must be in a noisy environment.

In many instances engineers have been able to eliminate or materially reduce noise at the source. This is particularly true of industrial noises or noises emanating from an operating procedure which can be controlled at the source. As to the aircraft engine, since the noise is directly related with the power produced, it is not feasible to reduce the noise at the source, although research is pursued with that objective. Noise is reduced in part through improved performance of aircraft engines, particularly where rough burning of engine fuels has been eliminated. It has been possible also to reduce the noise of the explosion on the afterburner of the jet aircraft.

Where noise cannot be eliminated or sufficiently reduced at the source, the engineer recommends, as a prime measure, the use of acoustic material. Other methods include changing the relative position between source of the noise and those affected—structural changes to reduce vibration noises, or construction of sound barriers. Corrective action in noise control parallels other environmental conditions. It calls for application of all available disciplines. Each problem must be studied of itself, with the aim of arriving at the most economical and feasible solution.

Personnel Protective Measures

The engineers of the Medical Service of the Air Force have a prime responsibility to assure that the corrective action taken following the location of a noise hazard is adequate and effective. The responsibility here is primarily the protection of personnel. In addition, it is an evaluation to assure that the economical method will suffice.

Personal protective equipment for personnel is limited by obstacles in design. At the present time, the most effective ear defender is a properly fitting earplug. The use of earmuffs and helmets, which with earplugs give some additional protection, is limited by the nature of the seal. All personnel exposed to a hazardous noise level must be fully acquainted with the need for the protection afforded by properly fitted ear defenders. Engineers owe it to the personnel to see that such equipment is available.

In addition to the personal protective equipment, personnel protection is secured through previously noted control measures. Specific examples include a properly designed control booth for operators at engine test cells and sound suppression in control towers, classrooms, and barracks.

The engineer through his contacts in his daily work is an ideal member of the medical service to impress on supervisors as well as workmen the importance and necessity of wearing earplugs and other ear defenders in a noisy environment. In addition, they can serve as ambassadors in acquainting the personnel, both on and off the base, with noise hazards and corrective steps.

Engineers of the medical service must see that properly designed and equipped audiometer

rooms are available for audiometric examinations of personnel exposed to high noise levels. In designing an audiometer room, consideration must be given to its environment. Operating agencies desire the room to be located in the immediate industrial area to save time of personnel. Such a location places an additional burden and expense on the acoustical design. The engineers, through their surveys, establish the areas where personnel are exposed to hazardous noise levels. Such surveys determine the audiometric testing cycle.

This brief review reveals the scope of the problem of noise in modern living. In many areas, knowledge is incomplete, but current and future research may reduce the uncertainties.

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1956 Community Health Week

March 18–24, 1956, has been designated Community Health Week, to be headlined under the banner "Let's Do More About Health." The National Health Council and the United States Junior Chamber of Commerce are the sponsoring organizations.

The success of the initial observance of Community Health Week in March 1955 led the sponsoring organizations to their decision to repeat the performance. Last spring, 180,000 Jaycees across the country helped to arrange health fairs and rally the people to attend. Their efforts inspired television and radio shows as well as newspaper features and special news sections telling the people about needs of local health services and the health resources to look for in their own community.

The United States Junior Chamber of Commerce will have available after January 1 a work kit which it has produced as a guide for those engaged in organizing activities for a community health week. The kit will be distributed to Jaycee chapters requesting it from the Tulsa, Okla., headquarters of the junior chamber. In communities without Jaycee chapters, local affiliates of national organizations may request kits from the National Health Council, 1790 Broadway, New York 19, N. Y.

The contents of the kit, prepared by members of the staff of the National Health Council and its member agencies, include leaflets describing "Newspaper Health Supplements," "Health Fairs," and "Movies Tonight"; a checklist of projects which a community may launch during health week, such as accident prevention campaigns, establishment of preschool clinics, fluoridation of municipal water supplies; and a list of National Health Council member agencies to facilitate community cooperation.

A fundamental goal of research in this field is to provide bases for the formulation of public health policy. Using examples of research undertaken at the Robert A. Taft Sanitary Engineering Center and elsewhere, the author discusses the role of statistical concepts in providing these bases.

Statistics Applied to Research in Environmental Sanitation

By EUGENE K. HARRIS, Ph.D.

PROBABLY the most valuable application of statistical concepts in the environmental sanitation field is in determining the extent to which a given situation represents a public health problem. Another job, almost as important, is that of analyzing objectively the technical procedures on which much of public health policy and action is based.

The second task is often the easier. Two investigations, one on milk and the other on shellfish pollution carried out by personnel of the Robert A. Taft Engineering Center, may serve as examples. The first of these, an analysis of variation in the direct microscopic clump count on milk, has been mentioned briefly by Black and Myers (*1*). The study was small in scale, yielding results which are only indicative. Its purpose was to analyze variation in milk counts into two broad components: variation in the counts of a single observer and variation attributed to differences between observers.

Dr. Harris, an analytical statistician with the Robert A. Taft Sanitary Engineering Center, Public Health Service, Cincinnati, Ohio, presented this paper before a joint session of the laboratory and epidemiology sections of the Western Branch of the American Public Health Association, meeting in Seattle, Wash., May 11, 1954.

The Milk Clump Count Study

The most interesting part of the milk clump count study concerns the examination of milk with 100,000 to 200,000 bacteria per milliliter (the upper half of the grade A range in raw milk to be pasteurized). Cooperation was obtained from four men, all with long experience in the direct microscopic count. Each man prepared five replicate films from the same lot of milk, following the procedures of 1948 Standard Methods for the Examination of Dairy Products (*2*). The number of fields read was determined by each observer on the basis of his counts on the first film examined, using the table in standard methods as a guide.

In this way, 20 counts were generated. Analysis revealed that the variation (standard deviation) attributable to differences between observers amounted to 63 percent of the mean count, while variation "within" the average observer amounted to 34 percent of the mean count.

Variation between observers probably arises chiefly from differences in ability to distinguish bacterial clumps when examining a film.

Nevertheless, a test was made of the possibility that mixing of the original sample was incomplete so that readers received portions of varying density or that individual differences in preparing films resulted in varying mean counts. Each observer examined one slide selected at random from each of the sets prepared by his colleagues. In no case did the mean or the variances of the counts on these films differ significantly from the corresponding statistics on his own slides. Apparently, some individuals tend to read "high" and others "low."

For 3 of the 4 readers, the observer variation was about as much as would be expected on the basis of a random distribution of bacterial clumps over a film. The fourth reader, who reported the lowest mean count—about 100,000 per milliliter—showed significant nonrandom variation, due most likely to fluctuations in judgment, attention, and other personal factors.

This small milk count study has been described partly to illustrate a simple statistical design for analyzing the precision of a laboratory method, but more especially to emphasize the importance of the subjective, personal factor in laboratory diagnosis. Improvements in mechanical technique, or in the composition of materials, will be of little worth if the persons applying the methods remain highly variable in their interpretation of what they see.

Finally, what administrative use can be made of these results? They indicate that a single direct microscopic count may not be too reliable a measure of bacterial density, chiefly because of great variation among observers. On the other hand, 3 of the 4 observers exhibited a high degree of internal consistency. It seems, therefore, that from a practical standpoint, the direct count will be most effective when used by a single experienced observer in judging the continuing quality of milk produced over a long time by a given dairy farm. Once the observer has established his own baseline of quality for a certain milk, the direct count will enable him to detect gross deviations from that baseline (that is, counts averaging at least 50 percent greater than his usual observations) regardless of whether he is by nature a "high" or a "low" reader. The fact that well-operated dairy farms are able to keep raw milk counts far below the grade A limit adds weight to the argument that the direct count is more efficient as a measure of continued quality control than as a criterion for grading any one lot of milk.

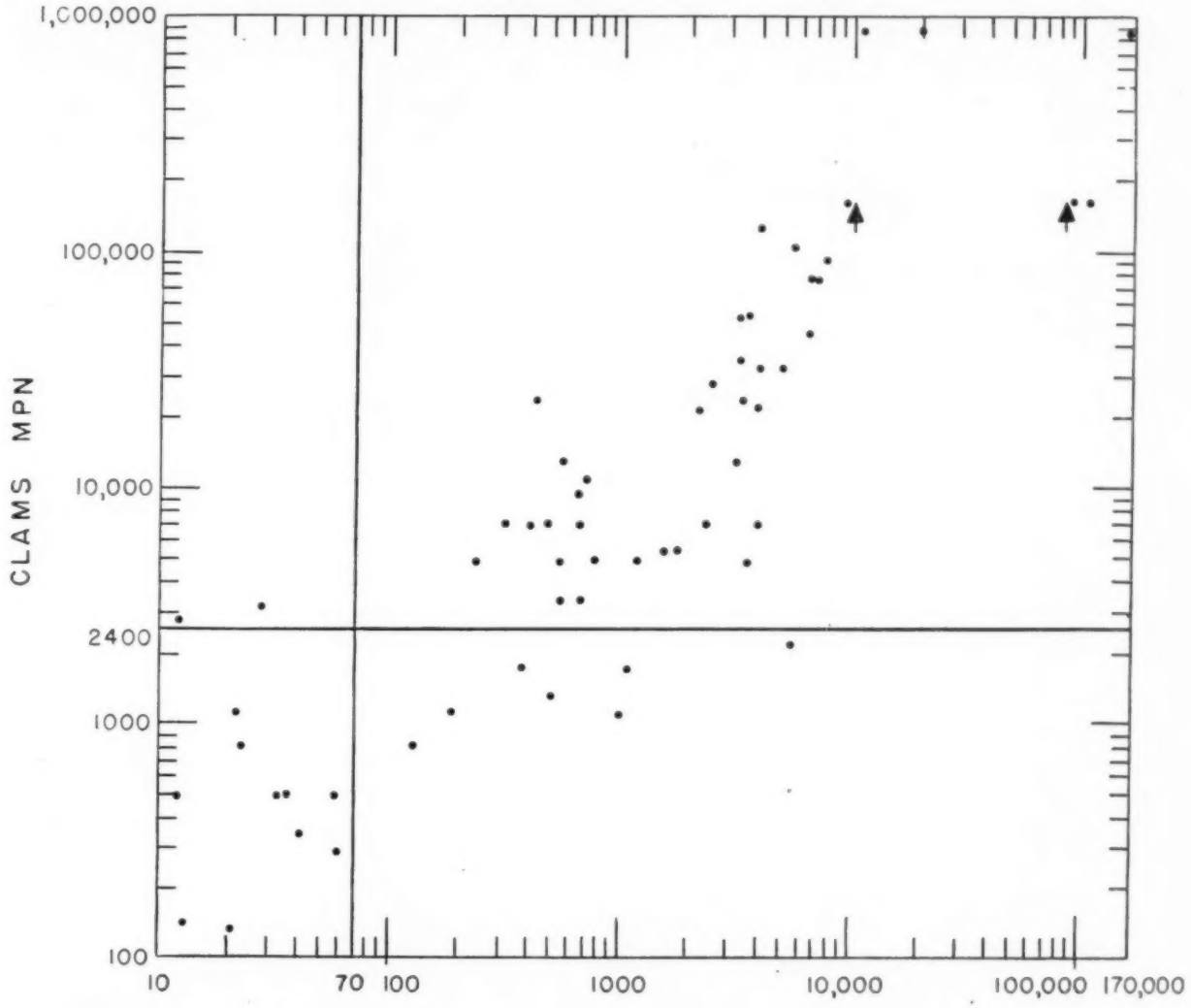
Shellfish Pollution Study

Another study which offers some interesting concepts to the health official desiring an objective basis for policymaking is that by the Shellfish Sanitation Laboratory operated as a field station under the center. It concerns the relationship between the density of coliform organisms in water overlying shellfish beds and the coliform density in the shellfish themselves. The data obtained in this investigation are now in the process of final analysis for publication and hence will not be discussed in detail. The study is mentioned here for illustrative purposes only.

The Manual of Recommended Practice for Sanitary Control of the Shellfish Industry (*3*) classifies shellfish growing areas according to the median most probable number (MPN) of coliform organisms in water samples collected during the harvesting season. A median less than 70 per 100 milliliters defines an approved area; between 70 and 700, a restricted area; and greater than 700, an area closed to shellfish growing. Of course, this is not the only basis for judging shellfish quality; the sanitary survey is doubtless the most effective guide. Nevertheless, numerical standards have a powerful attraction, and, in order to justify certain water standards, we should know the effect on the shellfish of a given level of pollution in the overlying water.

In the laboratory study, hard-shelled clams (*Venus mercenaria*), soft-shelled clams (*Mya arenaria*), and oysters were studied in laboratory flats under widely varying water pollution loads at temperatures ranging from 4° to 23° C. Most probable number determinations were made on both water and shellfish samples at frequent intervals, according to the procedures recommended by the American Public Health Association (*4*). Most of the experiments ran from 3 to 4 days, some from 2 to 3 days, and one or two slightly longer than 4 days. Since a

Water and clam MPN's in moderate temperature range (8°–17° C.). Arrows designate MPN's not precisely determined but greater than the charted values.



great many more water than shellfish samples were taken, each shellfish MPN was matched with a geometric mean MPN in water based on samplings made during a prior 12-hour period.

Water and shellfish MPN's were plotted as abscissa and ordinate, respectively, on a logarithmic grid for each species of shellfish in each of three temperature ranges. The resulting scatter diagrams may be subjected to a number of different analyses. Before proceeding, it is well to emphasize that the data of this particular study were obtained from relatively small numbers of shellfish subjected to controlled pollution under laboratory conditions. Nevertheless, this type of data, namely, matching water-shellfish coliform indexes must arise when studying the relation between water pollution and the sanitary quality of shellfish.

The following plan for analysis of such data appears to be the simplest and probably the most useful to the public health official. For example, from one of the graphs for soft-shelled clams, let us select some prominent MPN's per 100 milliliters in water and clams, say 70 and 2,400. The manual suggests that an MPN of 2,400 or more coliform organisms per 100 milliliters occurring in clams taken from the growing area indicates unfavorable conditions or practices surrounding the production of these clams and necessitates further investigation.

A vertical line is drawn intercepting the X-axis at $X=70$ and a horizontal line intercepting

the Y-axis at $Y=2,400$. As shown in the figure, these lines cut the scatter diagram into four blocks, which may be labeled northeast, southeast, southwest, and northwest.

Let us assume that the sanitary quality of clams in which the MPN exceeds 2,400 coliform organisms per 100 milliliters should be regarded with suspicion. Then, the northwest and southeast blocks represent risks incurred in operating at a mean MPN of 70 for approved waters. The proportion of northwest points to all western points estimates the probability that clams of suspicious sanitary quality will be harvested, while the proportion of southeast points to all eastern points estimates the probability that satisfactory clams will not be accepted immediately but will at least have to undergo further purification. We can reduce the risk of harvesting suspicious clams by lowering the permissible MPN in water, but this increases the risk of rejecting acceptable clams. It becomes necessary to define quantitatively the relative importance attached to each risk.

Suppose, however, that some number other than 2,400 is decided upon as a critical point with respect to the sanitary quality of clams. Then, the numerical estimates of the risks change and with them the bases for a decision of permissible water pollution. The question of proper limits is a very complicated one. This type of analysis merely offers the health official one quantitative criterion by which to estimate the effects of proposed limits.

Hazard Indicators

We have mentioned that statistical concepts achieve their greatest value in public health research when they can be used to determine to what extent a given environmental situation represents a public health problem. This statement needs further definition. As a rule, official recognition of a health hazard results from an outbreak of disease followed closely by epidemiological investigation. However, in order to translate mere recognition of a health hazard into an effective program for its control, two basic conditions must be met. One or more variables must be selected to serve as indicators of the hazard, and the variables must be calibrated so that by measuring them we may measure the severity of the hazard. This latter condition implies that quantitative research is necessary to determine, at least approximately, that point on the scale at which the hazard becomes sufficiently great to merit official action.

As examples of attempts to measure the relationship between indicator variables and health hazards, two investigations will be summarized briefly. The first consists of a series of studies by A. H. Stevenson and R. S. Smith of the center and T. D. Woolsey of the Division of Public Health Methods, Public Health Service, on the relation between bathing water quality and health (*5*).

Natural Bathing Water Quality

Three different classes of natural bathing water were studied: a great lake, an inland river and nearby swimming pool, and a coastal water. Selected in each study were two swimming areas which appeared on the basis of past records to differ markedly in bacterial quality but which were used regularly by families of similar socioeconomic levels.

Illnesses recorded during the study were eye, ear, nose, and throat ailments, gastrointestinal disturbances, and skin irritations. The two occurrences of significant positive correlation between illness incidence rate and bathing water quality are of particular interest since in each case the comparison was between extremes of bacterial quality, namely, median MPN's of 2,700 and 2,300 on the one hand, and less than 3 and 43 on the other. In one instance, only gastrointestinal illness rates were concerned; in the other, the correlation extended to all types of reported illness. In view of the general lack of correlation found between illness rates and variations of coliform density in the range up to about 700, the authors believe that "some of the strictest bacterial quality requirements now existent for natural bathing water might be relaxed. . . ."

Apart from the value of the findings, these studies are noteworthy because of the manner in which the data were collected. Each participating family maintained a daily diary of swimming and illness experience, recording the information on a calendar form according to a special code. This way of gathering information is in contrast to the interview method

whereby a trained investigator calls upon the family at scheduled times, eliciting information on morbidity during the preceding interval. The interview method suffers from the disadvantage that frequent visits are required in order to avoid the dangers of bias due to lapses of memory on the part of the respondent, especially for minor illnesses which were of chief concern in the bathing water studies.

On the other hand, a morbidity survey which requires the cooperating family not only to supply but also to record the data is subject to the risks of illegible and inadequate information. These difficulties were avoided in the bathing water studies by providing a simple code printed below the calendar; by carefully reviewing the diary form with the housewife; and, finally, by maintaining contact with the family during the study through telephone, mail, and an occasional personal visit.

Meteorological Factors and Air Pollution

The second example of quantitative research into the effects of environmental factors on health is in the field of air pollution. This project is the first step in a search for the possible health effects of minor changes in weather and atmospheric pollution. With respect to the effects of weekly variations in weather factors, an early study by L. J. Reed (*6*) of Johns Hopkins University, using statistics of England and Wales for the years 1865 to 1914, is of interest.

Weekly mortality records from the city of Cincinnati are being examined to find out if a pattern of variation exists which may be correlated with local meteorological factors and especially with some measure of air pollution. The mortality data on punchcards have been made available through the cooperation of the city health department. This study initiated by Dr. K. H. Lewis of the center and now being carried on under the writer's immediate supervision is the sort of work which may be undertaken by State or city health departments.

Progress to date of the Lewis study may be outlined as follows. Mortality during the period from January 1952 to December 1954 has been tabulated for 22 causes of death by age group and week of death. From these tabulations, four causes, comprising a group of cardiovascular diseases, have been selected. The successive weekly totals for all ages have been plotted on graphs for each year. The same has been done with deaths from respiratory causes and total deaths from all causes, but so far analysis has been confined to the cardiovascular group.

The general trend of cardiovascular deaths in any year could be fitted very well by a simple curve. Selected in each year were short periods of time during which significant deviations from the curve were apparent—either peaks or dips. The same techniques are now being applied to various weather factors (temperature, pressure, percent of possible sunshine, and so on) for which weekly medians or totals may be calculated from publications of the Cincinnati office of the United States Weather Bureau, and to a continuous measure of air pollution—the intensity of staining of filter paper in a Hemeon automatic smoke sampler. Information on this variable has been obtained through the cooperation of the Cincinnati Bureau of Smoke Inspection. It is possible that obvious deviations from the general mortality trend will be clearly associated with similar deviations in one or more environmental factors. More likely, in order to reveal any correlations, it will be necessary to analyze all weekly deviations observed in mortality, weather, and air pollution pictures.

Summary and Conclusions

This discussion has implied the need for careful research in defining the nature and content of control programs in environmental sanitation. Nevertheless, it is a common experience of health officials to be called upon for action in an emergency situation and to have to devote to the operation of an untested control program resources that might otherwise be spent on research leading to a more efficient program. There can be no criticism of this when the need is obvious and when at least the qualitative aspects of the necessary control procedures are known. Eventually, however, every such procedure calls for reevaluation, sometimes in terms of errors of measurement but always in terms of health significance. By means of specific examples, I have tried to illustrate the ways in which research based on

statistical concepts may aid in the evaluation of current sanitation programs and in the planning of new ones.

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Harold R. Sandstead, 1904–1955

Dr. Harold R. Sandstead, nutrition expert on the staff of the National Institute of Arthritis and Metabolic Diseases, was killed in the November 1, 1955, airplane crash in Colorado. Dr. Sandstead held the rank of medical director in the commissioned officer corps of the Public Health Service. For the past year he was executive director of the Interdepartmental Committee on Nutrition for National Defense. He joined the Service in 1934.

Dr. Sandstead was honored in 1945 by the Netherlands Government for his work on nutrition in Holland. He also received the Bronze Star for this work from the United States Army. In 1954, the Army awarded him the Bronze Star with Oak Leaf Cluster for his work on nutrition in South Korea. A memorial fund for medical students has been established in Dr. Sandstead's name by Vanderbilt University, Nashville, Tenn., where he served as assistant professor of medicine during 1940–53.

Printed in a recent issue of the Netherlands *Tijdschrift voor Sociale Geneeskunde* (*Journal of Social Medicine*) was a tribute to Dr. Harold Sandstead. Excerpts from this tribute, freely translated, are published below at the request of Dr. C. Banning, chief medical health officer of the Netherlands.

"Dr. Sandstead's name transports us directly back to the first months after the liberation. In our memories, we see this outstanding American laboring day and night to assist in the rebuilding of the Netherlands.

"On the SHAEF mission, he was prominent among those who hastened to help our country. He was particularly interested in the problem of starvation and malnutrition. Sandy, as many friends called him, took an important part in investigating malnutrition, especially in the western part of our country.

"With the late Sir Jack Drummond and Prof. G. C. E. Burger, he completed a report on Malnutrition and Starvation in Western Netherlands. In the introduction to this report, our Minister of Social Affairs thanked the composers, calling them the international 'triumvirate.' Concerning Dr. Sandstead, the Minister says that Lt. Col. H. R. Sandstead, as head of the health section of the SHAEF mission to the Netherlands, contributed much to the recovery of the health of the population of our country and to the relief activity.

"No wonder that in October 1945 our Queen honored Dr. Sandstead as Officier in de Orde van Oranje-Nassau met de Zwaarden (Officer of Orange-Nassau with the Swords).

"His more intimate friends know that Sandy not only gave material help and took care of the supply of food, medicine, and equipment, but he was a man of warm feelings who also gave moral support and assistance. This American officer understood and participated in the sorrow the occupation had caused us.

"From my personal experience, I know that Holland had a special place in Sandy's heart. He was deeply interested in everything happening in Holland, and he rejoiced in the swift rebuilding of our country. Holland has lost a great American friend. To his very many friends here, his death has left a great vacuum."

technical publications

Public Sewage Treatment Plant Construction, 1954

Public Health Service Publication No. 453. 1955. 18 pages. 20 cents.

Public Sewage Treatment Plant Construction for the calendar year 1954 supplements and brings up to date the information contained in the reports for 1952 (PHS Pub. No. 291) and 1953 (PHS Pub. No. 409). The report indicates the progress made by municipalities during 1954 in providing the sewage treatment facilities necessary to prevent pollution of water resources on which downstream water users depend.

Contracts were awarded for 716 projects costing $227.5 million, an increase, after adjustment for cost index fluctuation, of 21 percent over 1953 construction. Of the 1954 contracts, 366 were for new plants, costing $143.2 million, and 350 were for additions, enlargements, or replacements of existing plants, costing $84.3 million. The appendix to the report lists individual projects, by State, giving type of construction and cost of each.

Venereal Disease Clinics Directory

Public Health Service Publication No. 257. Revised 1955. 144 pages. 70 cents.

Names and addresses of the Nation's venereal disease diagnostic and treatment facilities, days and hours of service, and fee basis for use of each facility are listed in this directory.

It is published biennially by the Public Health Service Venereal Disease Program to provide the latest information on these clinics and other facilities. The material included in the 1955 edition has been compiled from information supplied by the health departments of the 48 States; the Territories of Alaska, Hawaii, Puerto Rico, and the Virgin Islands; and by the Division of Hospitals of the Public Health Service.

Summaries of premarital and prenatal laws as they pertain to venereal disease are given for each State and Territory having such laws, and laboratory facilities available in each State are described.

The current directory shows that 40 States and 3 Territories have premarital laws requiring blood tests and physical examinations for venereal disease, while 42 States and 3 Territories have prenatal laws requiring blood tests for pregnant women.

Nutrition and Healthy Growth

Children's Bureau Publication No. 362. 1955. 36 pages. 20 cents.

Quantities as well as kinds of food that will contribute most to good nutrition during pregnancy and throughout childhood are presented in this pamphlet, which is addressed primarily to teachers, nurses, social workers, and other personnel working with parents. Sample meals for children at varying stages of development are given. Common foods and the contribution each makes to good nutrition are listed in an appendix.

A Comprehensive Program for Water Pollution Control

Lower Portion of Upper Mississippi Basin

Public Health Service Publication No. 450. Water Pollution Control Series No. 71. 1955. 53 pages; illustrated.

Developed in cooperation with water pollution control agencies of Iowa, Minnesota, and Wisconsin and adopted by the Public Health Service, this program is based on data available as of November 1, 1954.

Among the recommendations for municipalities are: sewage treatment plants for 26 municipalities and institutions now discharging untreated sewage to the basin watercourses; replacement of 9 existing plants; enlargement or additions for 33 plants; and connection to existing municipal sewers of 1 plant. For industries, requirements include: 66 new treatment plants; enlargement or additions for 33 existing plants; replacement of 2 plants; and connection to existing municipal sewers of 4 plants.

Industrial Waste Guide to the Wool Processing Industry

Public Health Service Publication No. 438. 1955. 14 pages; illustrated. 15 cents.

Third in a series of Industrial Waste Guides, this one is intended primarily to aid operators of woolen mills and commission processors in using, reducing, and otherwise suitably disposing of their wastes. Like its predecessors in the series (the first was for the milk processing industry, and the second, for the meat industry), it is based on two premises. First, the greatest possible recovery, use, and reduction of wastes is necessary for the most economical production; and, second, protection of the Nation's limited

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This section carries announcements of all new Public Health Service publications and of selected new publications on health topics prepared by other Federal Government agencies.

Publications for which prices are quoted are for sale by the Superintendent of Documents, U. S. Government Printing Office, Washington 25, D. C. Orders should be accompanied by cash, check, or money order and should fully identify the publication. Public Health Service publications which do not carry price quotations, as well as single sample copies of those for which prices are shown, can be obtained without charge from the Public Inquiries Branch, Public Health Service, Washington 25, D. C.

The Public Health Service does not supply publications issued by other agencies.

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water resources for maximum use is necessary in order to bolster our national health and economic growth.

The guide was prepared for the Public Health Service by the Stream Pollution Abatement Committee of the American Association of Textile Chemists and Colorists under the sponsorship of the National Technical Task Committee on Industrial Wastes.

The Halogenated Hydrocarbons, Toxicity, and Potential Dangers

Public Health Service Publication No. 414. 1955. By W. F. von Oettingen. 430 pages; illustrated. $2.50.

Intended for physicians, entomologists, engineers, and persons interested in agriculture, this publication deals with the toxicity and potential dangers of various halogenated hydrocarbons—aliphatic, olefinic, cyclic, aromatic, and aliphatic-aromatic. It covers, therefore, a great number of industrial solvents, refrigerants, fumigants, and insecticides.

Directions are included for the prevention and treatment of poisoning in humans by these chemicals.

PHS Films

Milk Sanitation Series: Cleaning-in-Place for Pasteurization Plants

35 mm. Filmstrip, color, sound, 12 minutes, 63 frames. 1955.

Audience: Sanitary engineers, sanitarians, and dairy science students.

Available: Loan—Public Health Service, Communicable Disease Center, 50 7th St. NE, Atlanta 23, Ga.

The cleaning-in-place method of cleaning milk lines by recirculating a cleaning solution throughout the piping system is the subject of this filmstrip.

This method is represented, through contrast, to be superior to the manual cleaning method, whereby pipes and connections are cleaned individually. A typical installation for the cleaning-in-place method, consisting of the milk line, separate recirculation unit with return line, and solution tank and pump are shown. In addition, a step-by-step cleaning-in-place operation, from preparation of cleaning solution and checking flow velocity through post-rinsing with lukewarm water and bactericidal treatment of the entire system before starting the milk flow, is followed.

Installed glass and metal cleaning-in-place piping, fittings, gaskets, and welded connections are pictured. Among the check-points depicted are removable fittings, slopes and supports of pipes, accumulated charts, and the recording thermometer, which gives temperature and circulation time.

Basic Use of Levels by Sanitarians

35 mm. Filmstrip, color graphics, 8 minutes, 45 frames. 1954.

Audience: Sanitary engineers and sanitarians.

Available: Loan—Public Health Service Communicable Disease Center, 50 7th St., NE, Atlanta 23, Ga. Purchase—United World Films, Inc., 1445 Park Avenue, New York 29, N. Y.

The basic uses of engineer's, string, carpenter's, and hand levels and the transverse hose filled with water are pictured in this filmstrip.

To accomplish this, the installation of a septic tank is demonstrated. A specific demonstration relates to the grade board in one section of a drain field. Any one of the five methods demonstrated can give satisfactory results if sufficient time and care are taken. A knowledge of the use of at least one instrument is essential in sanitation work.

Serving Food

16 mm. Film, color, 10 minutes. 1954.

Audience: Sanitarians and public health workers.

Available: Loan—Public Health Service, Communicable Disease Center, 50 7th St., NE, Atlanta 23, Ga. Purchase—United World Films, Inc., 1445 Park Avenue, New York 29, N. Y.

The fundamentals of orientation and induction training to be given a waitress by a restaurant hostess are stressed in this film.

Correct ways of clearing tables and the proper storage of cups, dishes, and glasses are portrayed. Safeguarding against disease through the development of satisfactory personal habits and periodic physical examination are advocated to protect the health of the waitress as well as the customer.

The waitress avoids touching the rims of glasses to protect herself and the customers.

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THIS INDEX to *Public Health Reports* is divided into two parts: a subject and an author index.

In addition to the subject headings, categorical headings include: ADMINISTRATION, ANNOUNCEMENTS, APPOINTMENTS, CONFERENCE REPORTS, DEATHS, EVALUATION, EXHIBITS, FILMS, FRONTISPIECES, GRANTS AND FELLOWSHIPS, IDEAS, LEGAL NOTES ON PUBLIC HEALTH, PUBLIC HEALTH MONOGRAPHS, PUBLICATIONS, RECRUITMENT, REVIEWS, TRAINING COURSES AND PROGRAMS.

Titles of articles appear as entries under the appropriate subject heading, followed by the author's name in brackets. One asterisk before the page number indicates an original article; two asterisks indicate a Public Health Monograph, published concurrently with *Public Health Reports*.

Illustrative material on the inside of the front cover of each issue is indexed by month under the heading "FRONTISPIECES." It is recommended, therefore, that the covers be included in a bound volume.

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ERRATUM: For line 10 under table 1, column 2, page 618, July issue, "were taken, positive identification of loose sur–" substitute: "its decay products to produce a constant emis-"

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